

# MOTOR AGE

Vol. XLIV  
Number 26

PUBLISHED WEEKLY AT THE MALLERS BUILDING  
CHICAGO, DECEMBER 27, 1923

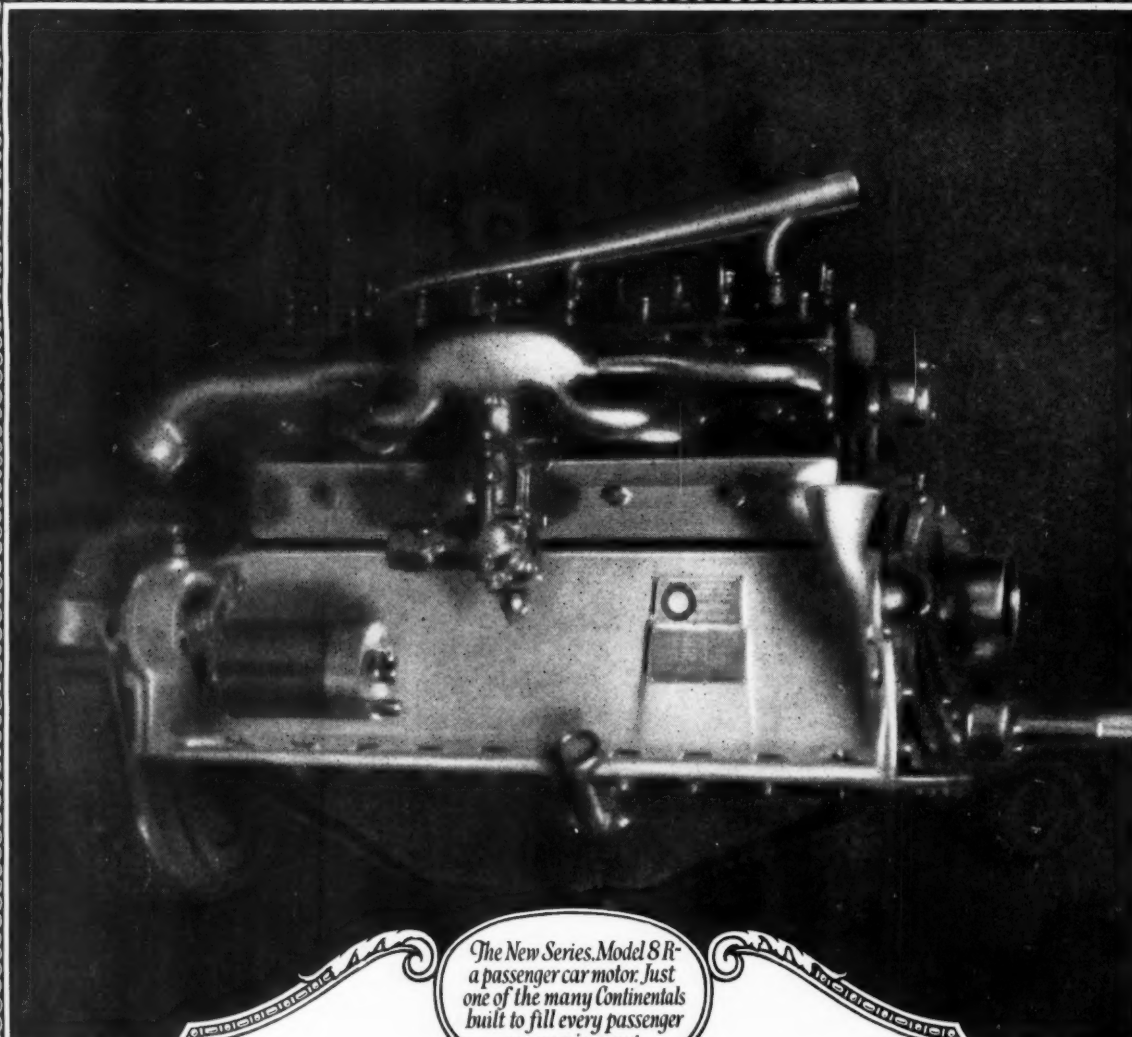
Thirty-five Cents a Copy  
Three Dollars a Year

**It is a source of rare satisfaction and genuine pride to me that so many Jordan dealers have made real money in 1923.**

**I happen to know that the New Year will be made even happier for them.**

*Edward S. Jordan*

President  
Jordan Motor Car Company  
Cleveland, Ohio



*The New Series Model 8 R—  
a passenger car motor. Just  
one of the many Continentals  
built to fill every passenger  
car requirement.*

**SUPERIOR** motor quality and performance are reflected in the steadily increased production schedules of the car and truck builders who equip their product with the Continental Red Seal.

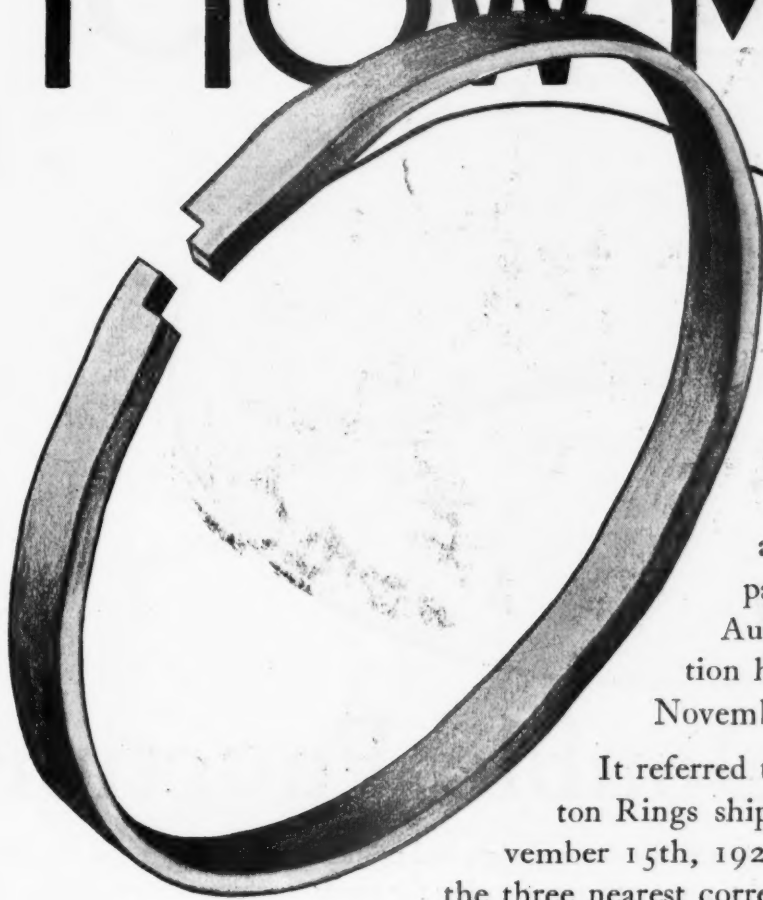
*The Largest Exclusive Motor Specialists in the World*

**CONTINENTAL MOTORS CORPORATION**  
DETROIT—MUSKEGON





# HOW MANY?



This was the question that was asked by the Piston Ring Company at the Convention of the Automotive Equipment Association held at the Coliseum, Chicago, November 12th to 17th.

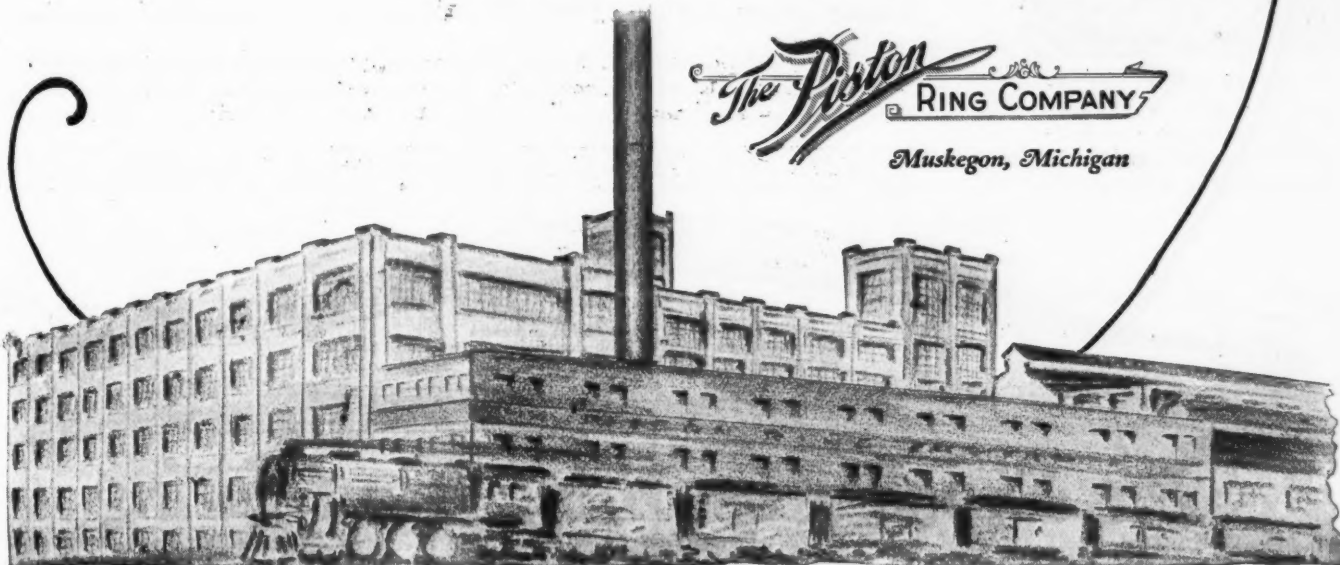
It referred to the number of **QUALITY** Piston Rings shipped from January 1st to November 15th, 1923, and prizes were awarded for the three nearest correct estimates.

The actual number shipped and the correct answer was

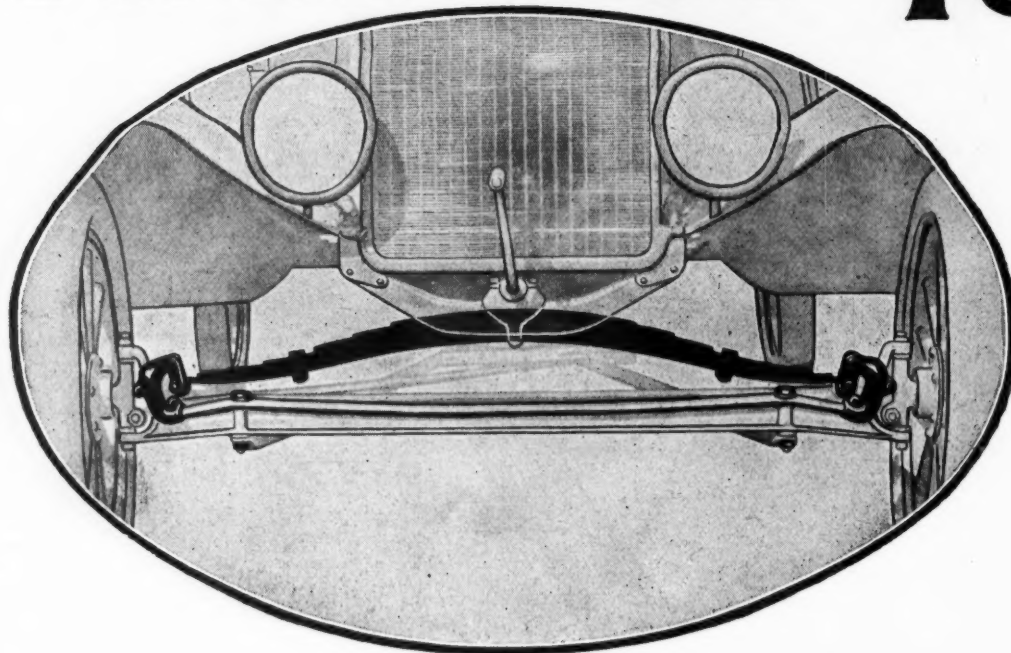
**21,037,817**

Whether for original installation or replacements, there is a universal demand for **QUALITY** Piston Rings.

*The Piston*  
RING COMPANY  
Muskegon, Michigan



# TRAINOR "45"



## Performs a Double Function

WITH its double sweep design and 12 inches extra length, the *Trainor "45"*, the 45-inch front spring for Fords, performs the functions of spring and shock absorbers combined. On rough or muddy roads, or in loose sand or gravel it absorbs the shocks and unsteadiness ordinarily passed to the body of the car.

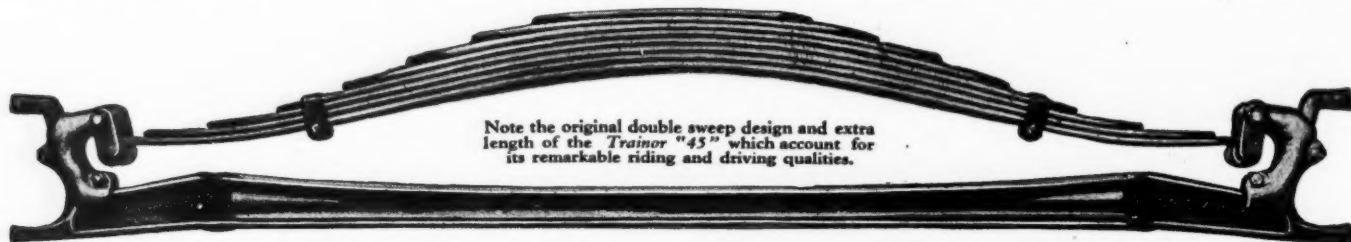


*"The Trainor Way", an improved method of handling replacement springs, is making more money for jobbers everywhere. - Write for it.*

The added comfort, ease and safety assured the Ford owner by the *Trainor "45"* make it one of the most saleable and most profitable items placed on the market in a long time. The *Trainor "45"* is made of high grade alloy steel—Trainor treated—and bronze-bushed—outlasting several times the ordinary Ford spring. And like all Trainor Springs, it is backed by the unqualified Trainor Guarantee of satisfaction.

Every Ford owner is a prospect for the improved riding and driving qualities assured by the *Trainor "45"*. The market is unlimited. Dealers—write for name of nearest jobber. Jobbers—write for distributing proposition.

TRAINOR NATIONAL SPRING COMPANY, New Castle, Indiana



Note the original double sweep design and extra length of the *Trainor "45"* which account for its remarkable riding and driving qualities.

## *The Shock-Absorbing Front Spring for FORDS*

# MOTOR AGE

Reg. U. S. Pat. Off.

Published Every Thursday by

THE CLASS JOURNAL COMPANY

5 So. Wabash Ave.  
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## A Personal 1924 Proposition for the Dealer

THE Goodrich 1924 contract is tailor-made for the dealer. If he wrote it himself, he could not better fit his needs. It is shaped to give him a prosperous 1924.

The basic Goodrich policy is a universal price to contract dealers. You know that your prices are the best Goodrich quotes anybody; and no other dealer anywhere can purchase Goodrich Tires for less. This policy is backed by liberal dating during the winter, and complete price protection.

Silvertown, the oldest, best known tire in the world, at record low prices—Commander Cord, challenger of all low price competition—and Goodrich "55", a quality fabric priced to defy rivals—give a line that enables a dealer to balk competition in every class of trade.

Don't sign any contract until you know it personally. Write the nearest Goodrich Branch for complete details.

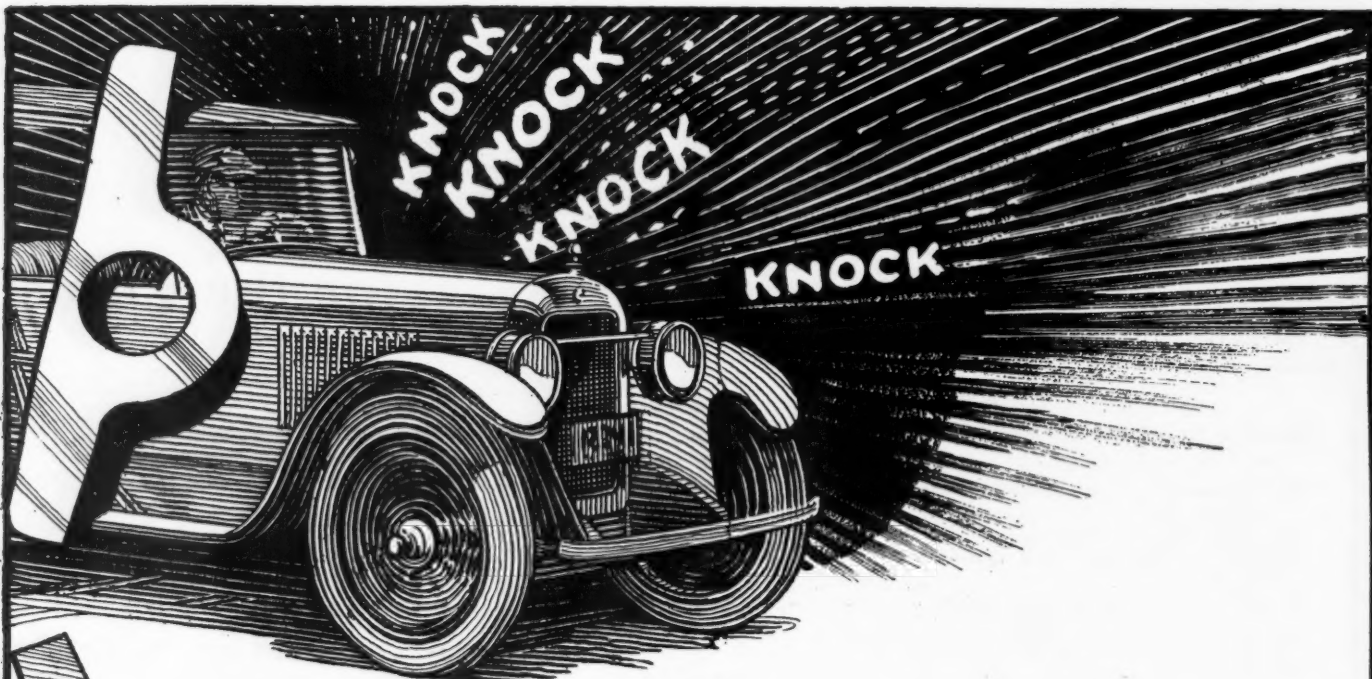
THE B. F. GOODRICH RUBBER COMPANY  
ESTABLISHED 1870

# Goodrich

## TIRES

"Best in the Long Run"





## Tell him how you can Knockout the Knock

WHEN an owner drives to your shop for repairs, or overhauling, look at the bearings. They may need adjustment. The wise owner has his bearings adjusted at least once each year and the alert serviceman can add to profits by helping customers knock out the "bearing knock" with—

# LAMINUM

"Peel 'em down to fit"

Laminated Shims have been adopted by 90% of all car and engine builders. Laminated Shims are used by practically every progressive serviceman and repairman. Laminated Shims save so much time: so many hours of labor and accomplish adjustments so well, that it doesn't pay to bother with old-fashioned, bothersome loose leaves. There's a Laminated Shim for every make of car.

*Send for Sample Shim*

New Replacement List and Data Book Now Ready. Write for Both

### LAMINUM-KIT

An all-steel compartment box containing 250 assorted shims for every make of car. The handy, dandy way to keep your shims in order and free from grease and dirt. Get your Kit! Your jobber has it.



*Address "Sales Dept."*

**LAMINATED SHIM CO., Inc.**  
14th ST. & GOVERNOR PL. LONG ISLAND CITY, N. Y.

St. Louis: Mazura Mfg. Co.

# STUDEBAKER



## Consistency

The Studebaker dealer has a consistent sales argument because Studebaker specializes in Sixes.

He is not subjected to the customary embarrassments which dealers must suffer who have to switch their customers from one car to another, of more cylinders or fewer cylinders—or to a different name on the radiator.

In other words, the Studebaker dealer does not have to talk against himself or get tangled up in the conflicting sales points of different types of cars.

He sells nothing but Sixes and can talk convincingly on the superiorities of the Six.

It is not difficult to sell the prospect on Studebaker's reputation for quality, value and integrity. This has been in the making for 71 years.

When the buyer is convinced of six-cylinder advantages and of Studebaker superiority, he can be fitted with a car of the size, style and price that will exactly suit him.

And when he comes to buy again, the Studebaker dealer can fit him again—and again—and repeat business is not only profitable but comes with little or no effort.

Studebaker dealers can make life-time customers and life-time friends out of every transaction.

There are many other advantages that make the Studebaker proposition the most attractive in the industry. You may have the details whenever you say.

THE STUDEBAKER CORPORATION OF AMERICA  
South Bend, Indiana

1924 MODELS AND PRICES—f. o. b. factory

LIGHT-SIX 5-Pass., 112" W. B., 40 H. P.	SPECIAL-SIX 5-Pass., 119" W. B., 50 H. P.	BIG-SIX 7-Pass., 127" W. B., 60 H. P.
Touring.....\$995	Touring.....\$1350	Touring.....\$1750
Roadster (3-Pass.).....975	Roadster (3-Pass.).....1325	Speedster (5-Pass.).....1835
Coupe-Roadster (2-Pass.)1195	Coupe (5-Pass.).....1895	Coupe (5-Pass.).....2495
Coupe (5-Pass.).....1395	Sedan.....1985	Sedan.....2685
Sedan.....1485		

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# THE HAYNES AUTOMOBILE COMPANY

MANUFACTURERS OF

**HAYNES**  
MOTOR CARS

ADDRESS ALL COMMUNICATIONS  
TO THE COMPANY

**KOKOMO, IND.**

Mr. Automobile Dealer:

Through the Haynes Merchandising Plan you can locate the real buyers in your territory weeks ahead of the other fellow.

You can have sales clinched, deals made, profits made certain, before other dealers wake up.

You can find not only the real prospects (buyers) first, but by having your choice of the best salesmen you can be assured of closing the maximum percentage of deals--on the most favorable basis.

A big business, a capacity business, means lower cost, LARGER PROFIT, on every sale--and it also means financing your business on the most favorable basis.


These facts tie up with your own experience and observation. You know they are real facts, not mere sophistry.

So, facing them, I dare you to show me a real valid reason why you should not hot-foot to Kokomo and have a talk with me, learn the full details of this new Haynes Merchandising Plan, and THEN decide what to do about it.

I'm willing to leave it squarely up to you AFTER you know the plan. But until then, I owe it to you as well as to myself to urge you to wire for the plan. Any day, but today best of all. Wire for the plan.

Yours for action,

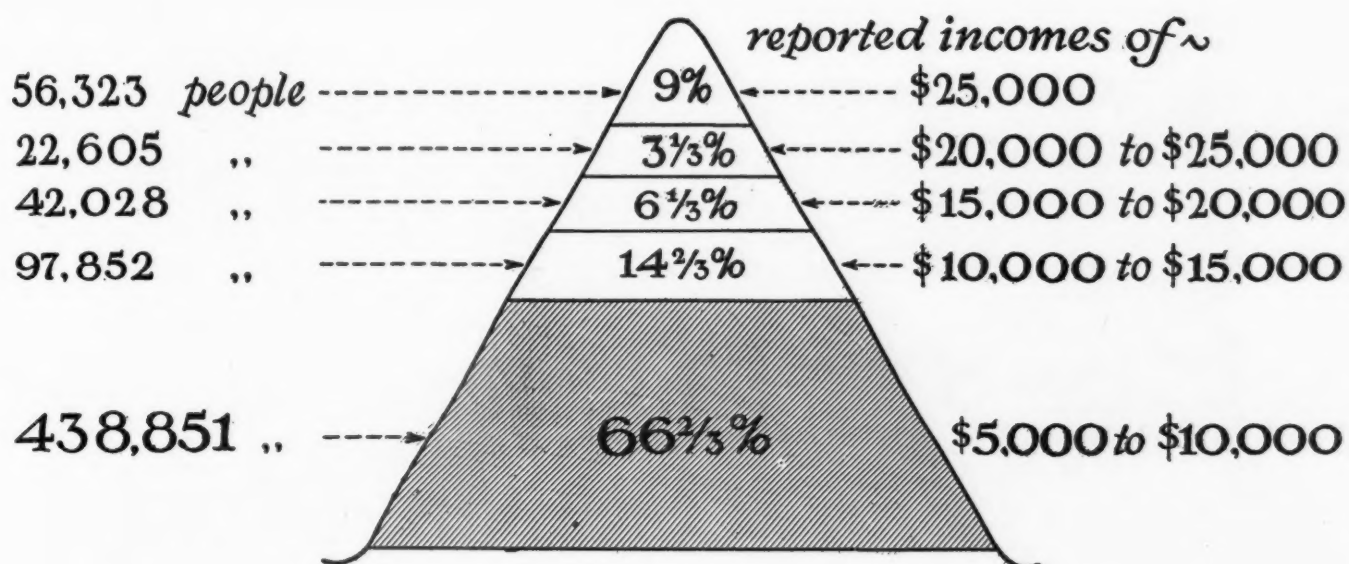
THE HAYNES AUTOMOBILE COMPANY.



General Sales and Advertising Manager.

(Advertisement)





## *Income Tax Statistics Show how Your Selling Opportunity Is Increased by MARMON'S New Low Price*

There is no question but that the recent Marmon price reduction has made the purchase of a Marmon possible to thousands of people who previously regarded it as just beyond their reach.

The above chart, based on latest available reports on taxable incomes of \$5,000 a year and up, shows how the selling power of a quality product increases out of all proportion as the cost of that article decreases.

The fact that the Marmon now sells for \$400 less, means a tremendous increase in the value of the Marmon franchise.

New Low Price, \$2785  
PHAETON, F. O. B. FACTORY

NORDYKE & MARMON COMPANY

Established 1851

INDIANAPOLIS, INDIANA

# MARMON





*Typical of thousands of Buick dealer establishments all over the country*

## Buick Pioneering Brings Prosperity

It has always been Buick's policy to pioneer new developments and improvements. Buick continually steps out further in the lead and Buick dealers enjoy better business and greater profits. Why not have your name on file?

**BUICK MOTOR COMPANY, FLINT, MICHIGAN**

*Division of General Motors Corporation*

Pioneer Builders of Valve-in-Head Motor Cars

Branches in All Principal Cities—Dealers Everywhere

---

WHEN BETTER AUTOMOBILES ARE BUILT, BUICK WILL BUILD THEM

---

# MOTOR AGE



A small portion of the Cadillac shop showing the method used in working under a car. In the background is a tool-room where all tools are placed immediately after the jobs are finished. Every tool has a numbered place and they can be checked by simply glancing over the room. Machine tools are located in the rear of this enclosure. The Buick shop also has a room of this type.

## Running the Automotive Business on the Department Store Basis

*There Are Sixteen Departments in the Drennen Motor Car Co. and Each Must Show a Profit or Give the Reason Why. Motor Boats and Power Boat Equipment Important Unit of Organization*

AN automotive department store with some 80,000 square feet of floor space, that is now building an additional building that will give them approximately 100,000 square feet of floor space, operating sixteen distinct departments, advertising in department store style, co-ordinated as a department store, and requiring each department to show a profit on the business done or give the reason why, is the exception in the automotive field today; but such is the business of the Drennen Motor Car Company of Birmingham.

"Every department that we operate shows a profit, with the single exception of the used-car department, and it won't be long until we are able to make a profit in this department," says Donald Drennen, vice president of the concern, and head of the Buick and Federal divisions of the business.

The main building occupied by this concern is 300 by 140 feet, two stories in height, giving a gross floor space of 84,000 square feet. This is said to be the largest single building occupied by a strictly automotive sales



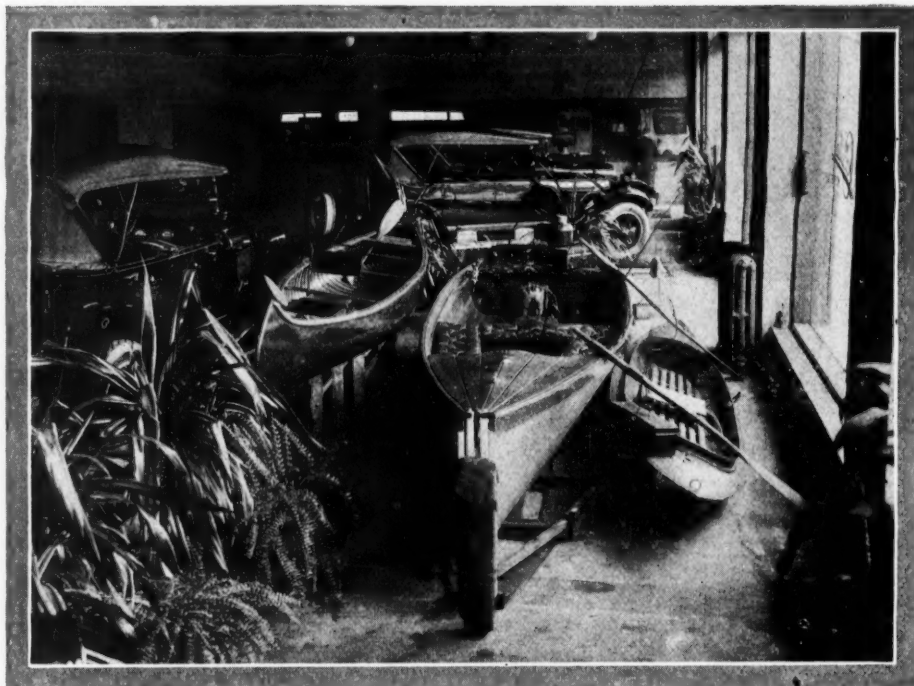
concern in the entire south, and it is thought that it is at least as large as any building occupied by a concern of this kind in the entire United States. It has been found necessary to construct a new building which will house the used-car and battery departments, and possibly the Federal Truck department. This building will add something like 17,000 feet of floor space to the total.

#### *How Departments Are Divided*

The concern is first sub-divided into four large and distinct divisions, and these divisions are divided into departments that make a total of 16 departments and several sub-departments. The divisions are: Buick, Cadillac, Used-car, and Federal Truck. The sixteen departments include: Buick sales, Cadillac sales; used-car sales; Federal truck sales; service departments for the Buick, Cadillac, and Federal, which are operated as separate departments; a repair shop for each of the three vehicles, which are operated individually; a paint shop, a top and upholstering shop, a vulcanizing shop, a tires and accessories department, a parts department, a battery department, a motor boat department.

It is said that this concern sells more motor boats than any other organization in the state of Alabama, although it is located in an inland town.

As an indication of the size of this concern the floor space occupied by the various departments should be of interest. The Buick repair shop for instance takes up a part of the second floor 70 by 150 feet, and the service department a space 50 by 150 feet on the first floor; the service and repair shops for the Cadillac take spaces of like size on the same floors. The space occupied by the top, upholstering and paint departments is 100 by 140 feet on the second floor. The tire and accessory department takes up a space approximately 65 by 140 feet in the corner of the store, and has the



*A boat display at Drennen Motor Car Company. This display features a small motor boat, and shows a canoe and a small row boat. Part of one of the motor car salesrooms is taken up for this window display*

advantage of 220 feet of show window space.

The used-car and battery departments of this concern are at present located in the main building, and the Federal truck department is located in a rented place. However, a building 120 by 140 feet is being constructed immediately across the avenue from the present location which will house the used-car and battery departments, and possibly the Federal truck department. If not, the Federal truck department will be moved into the main building.

The handling of used-cars is probably the most vital interest of all automobile dealers at present. This concern has de-

veloped a very good method of handling them; but freely admit that they still take losses in two directions. They state that this is solely due to the competition that they as well as other dealers cause; and that they believe it is only a short time now until, with the help of the manufacturers, the dealers will begin to realize the necessity of allowing not one cent more than they can afford on a used-car.

#### *Used Car Appraisal*

When an old car is tendered this concern in a trade they have it appraised. The appraisal forms the basis for the trade and is the price that is charged to the used-car department plus the cost of repairing, painting, making adjustments, furnishing new parts, new tires, or whatever may be necessary for the proper disposal of this car.

In case the sales manager of the department taking the car in trade wishes to exceed the appraisal of the used-car expert he can allow whatever he sees fit, but every time he does he gets a chance to tell in open meeting why he exceeded the value placed on the car by the used-car man, and his reason must be a good one.

In making his appraisal the used-car expert uses a bank form that shows every part of the car that is to be taken in, that is the main parts. This sheet gives a careful estimate of the condition of the car, what it will take to put into shape for sale and the amount that the sales department can afford to allow in taking it in.

Before a car is placed in the used-car department for sale it is reconditioned, more than likely painted, certainly cleaned to such a degree that it shines, new tires are put on it, if needed, and



*One section of the accessory and tire department of Drennen's Motor Car Company. The small boxes on the end are air-tight and protect the little accessories carried in stock from rust. Immediately back of this section of the department is the large tire salesroom*



*This section of the tire and accessory department is given over to the sporting goods handled by Drennens during the summer months; and to Christmas goods during December. The picture was made just before the change to Christmas stock had been made. Some of the minnow buckets, fishing rods and hunting coats are in sight*

everything done to make it really serviceable and certainly attractive to look at.

When it is put on the floor for sale it bears a tag showing what the concern hopes to get and a code of the lowest figure they will accept for the car. Possibly the car is marked up for \$700.00; the code shows XYZ, which means they will sell it for \$560.00, as a minimum.

The service stations or departments are said to be equal to any in the country. Every car that is brought in for attention drives into the service station of one or the other divisions. Large cars go into the Cadillac side, smaller cars into the Buick side. Special service is arranged for Cadillacs and Buicks. In case it is something that will not take very long to fix, the work is done in the service end of the business. They have things already prepared for Buicks and Cadillacs, such as brake linings.

#### **Handling Quick Service Jobs**

It only takes them a very few minutes to install these things and the happy owner is given a seat in one of the two waiting rooms, something to read and a nice view of the passing traffic. In this way they prevent a lot of small jobs piling up in the repair shop while the mechanics are working on bigger things.

If a job comes in that will take as much as an hour or more to fix, it is immediately put on an elevator and sent upstairs. The flat rate system is used on all jobs that are within the usual scope of a repair department, these prices are published in the full-page advertising that this concern uses each week. A customer is well acquainted with what he has to pay for a certain job, but it is not left at that, the service man tells him again what the charge will be for certain work.

When the job reaches the repair de-

partment it is looked over by the head of the shop, and assigned a place in the regular routine of the shop; in this way the owner gets an estimate soon after the car reaches the shop about how long it will be before he can expect his car again.

In case of special jobs, such as wrecks, a regular contract is drawn up and the signature of the owner is required, as well as the signature of the firm. This work is not mixed in with the regular repair work, but is handled so that it will not interfere with the routine of the shop.

The men employed in the shops of this concern are paid straight wages. It is the opinion of the management that they get practically as much work in the same time as they would under the piece work system, get better work, and are not bothered with complaints from the workmen about favoritism.

The meetings of the department heads held by Hubert Drennen, the president of this concern, would interest any automobile dealer who could attend one. At these meetings are fourteen heads of departments, four heads of the divisions, Drennen, and an additional man from the parts department, making a total of 20. These meetings are held as a part of the co-ordination work of the various departments. In addition to this, three times each year the entire organization is gathered together at a dinner, with more than 200 people present.

#### **Daily Sales Meeting**

Other meetings of certain departments are held, particularly the departments handling sales. Each sales organization is gathered together by the various department managers at 7:45 A. M. every morning and the meetings last until they are through. At these meetings those present discuss what they did the day before and what they will do that day; with particular reference to the seeing of prospects, handling customers, etc.

The business is co-ordinated very much like a department store. The entire plant is connected with a house telephone system, guides corresponding to floor-walkers are furnished, and the salesmen are specialized in their lines. Not only this, but so thoroughly is the store systematized that one department seldom overlooks a chance to boost another.

If a man buys a Buick car from the Buick sales department, for instance, he is given a chance to buy extra tires, ac-



*A portion of the used-car department, showing the care with which cars ready for sale are treated. This department of the concern is to be moved as soon as the building now under construction is completed. The method of handling the cars will not be changed to any great extent, however. Every re-conditioned car in this room has been painted before being placed on sale*



cessories, etc., and introduced to the service department of the Buick division. The fact that he will not have to wait to have his car serviced is brought home to him by the salesman and the service man, and later is followed up by a letter.

Every department of this concern is expected to make money. Drennen stated that they all did except the used-car department. Each department is not only supposed to make money in the aggregate, but they are supposed to make it on each job or sale handled by them. Their records are supposed to show what each job cost, what they received for it, and the general office is supposed to supply the necessary additional figures and, in the final analysis, to show an actual profit. This is achieved to a marked degree. Naturally some sales and some jobs fail to show a profit but, if the reason is not obvious, the heads of the departments are called on to show why they did not make a profit on them.

#### Department Store Advertising

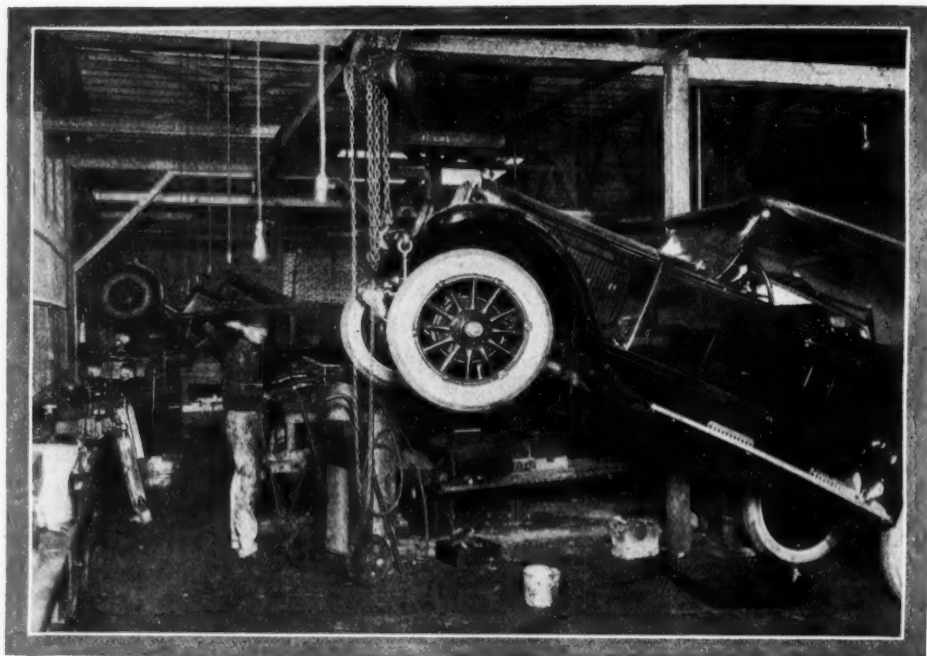
Advertising done in the newspapers is largely along department store lines. Many full page advertisements are used and are split between the various departments of the concern. In addition to this, smaller special advertisements are used. One of the main features of the advertising of this concern is "Drennen's Motor News", which is a page that appears in the Birmingham News every Sunday. This is strictly a department store type of advertising. Perhaps on one Sunday the main portion of this page will be given over to used-cars; the next might be the Buick Sunday, but always a part of the page is taken up with other departments, no matter what the leader may be.

An appeal to auto-sportsmen is made by this concern that is almost if not quite unique. They carry a full line of fishing tackle, motor boats, and other things that go with various sports in order to get the motorists who engage in this variety of open-air recreation to come into the store. This particular department is worked along with the tires and accessories, except for the motor boat end of it.

#### Catering to Sportsmen

"Practically all the fishermen and hunters in Birmingham have to use an automobile to reach the parts of Alabama in which they can follow their own particular sport desires", says the manager of this department. "We carry supplies for them so that they will come into the store and buy their accessories, tires, and automobiles for that matter. If you can show a fishing devotee a pretty new fly, or a good rod, you have him hooked and he will be sure to drop in and look over your stock."

In connection with this department it might be well to remark that during the Christmas and winter season it is stocked with winter goods and various Christmas presents for motorists, to take up the large space which is not necessary for fishing tackle at that season of the year. This department might be classed as part



A section of the Buick shop showing the methods of working on cars; the work benches where tools are kept only temporarily, and some of the features of this shop

of the advertising of the store, but it makes money as well.

A form of advertising that is the exception to the department store rule of this concern is the popularizing of the telephone number and the use of maxims and slogans that are different from the average department store ideas: One of these is the use of a telephone number, only: "Eight-two-six-will-get-you-fixed", primarily used to make the telephone number stick.

"My business is operated on the same basis as a department store", says Hubert Drennen. "For fifteen years before I went into the automobile business, which by the way was in 1908, I was with Drennen's Department Stores. Of course, when I first entered the automotive game I was filled up with department store ideas, they did not do me much good for many years, though I did have an accessory department, a tire department, and an automobile department from the beginning.

"During the last three or four years, however, I have found that the concern's growth and the enormous growth of the automotive business has made it feasible and, in fact, practicable and to our advantage to have an organization built along department store methods. There are many advantages to these methods of doing business.

#### Co-operation of Departments

"There isn't any doubt in my mind that the smallest department in my business helps me sell automobiles in larger numbers than a concern that does not offer the same service. A small thing like an accessory worth probably \$2.50 may sell a Cadillac before the year is out to a man that has never used anything but a Locomobile in his life.

"Having the departments work for a common goal, and at the same time seeing to it that they show an individual profit is a plan that is difficult to handle,

but when it is put across it means dollars rolling in that would not otherwise reach our cash drawers.

"I believe in my method and the stability of the automotive business. If I did not I would not put out so much effort to organize a big business and put into it all the ideas that I found of advantage in running a department store."

## 23 Years Ago This Week In MOTOR AGE

(From MOTOR AGE of Dec. 25, 1900.)

#### Couldn't Ferry Gasoline Vehicles

It is alleged that Philadelphia Congressmen will take up the fight of the auto men who are at present prevented from crossing any of the ferries with vehicles which carry gasoline.

#### Nearly 300,000 Now

The city of Chicago has issued 400 licenses to date. The authorities note that the late cold weather has put a stop to the aspirations of owners, of whom not one put in an appearance to apply for a license during the closing days of last week.

#### A Fine Show Room

NEW YORK, Dec. 22.—The Winton Motor Vehicle Co. is about to establish an eastern department and New York headquarters on a scale of spaciousness, elegance and convenience commensurate with the prominent position the company holds in the new industry. The great Palm Garden in connection with Proctor's Pleasure Palace on 58th street, near Third avenue, is being refitted and early in January will be ready for occupancy for its new use.



## Performance a Characteristic Feature of New Chrysler Six

*Effort Has Been Made to Get Uniform Output from Each Cylinder. Car Has Speed Range Up to 70 M. P. H. Six Body Styles Furnished*

THE Chrysler Six, which has been under development for the past three years and which will be marketed through the Maxwell-Chalmers organization, is now in production at the Chalmers plant. This factory has been retooled for the new car and production cars are now coming off the line. The manufacturing program and the tooling of the plant has been under the supervision of Walter Chrysler. The fact that the car is an entirely new design utilizing very few existing parts has necessitated an unusually complete retooling of the plant.

Although the car has been designed literally from the ground up by the Chrysler organization there have been no radical departures from existing practice. The powerplant is an L-head, block-cast six of 3 in. bore and 4¾ in. stroke, developing on average block-tests, 68 b.h.p. at 3200 r.p.m. With a piston displacement of 201 cubic inches, this is .34 horsepower per cubic inch. As these figures would indicate the engine has been designed from a performance standpoint, but the production viewpoint has been maintained as indicated by the predominance of flat straight line surfaces.

### Impressions of Performance

A MOTOR AGE representative drove one of the first cars over the roads about Detroit and found a speed range of from 1 to 68 miles per hour with a gear ratio said to be 4.6 to 1 and with the standard 29 by 4½ inch tires. This car was a five-passenger phaeton type with five passengers in the car at the time. The weather was rainy and there was no doubt sufficient slippage of the rear wheels to justify the manufacturer's claim for 70 miles per hour, not considering the full five-passenger weight. It



*Chrysler standard five-passenger phaeton showing the straight body lines*

is stated that acceleration measurements show the car will go from 5 to 25 m.p.h. in 8 seconds and from 5 to 50 m.p.h. in 13 seconds.

An effort has been made in the design of the engine to secure uniform output from each cylinder through precautions taken in manufacture, a distribution system based on the handling of liquids and equalized cooling by the introduction of water completely around each cylinder barrel and as far as possible around each valve seat.

In equalizing the output exhaust gas analysis tests have been made on each individual cylinder as a check on distribution and other factors governing combustion. In manufacture the machines are so arranged that the same tool enters each cylinder barrel in the block, thus reducing to a minimum variations in the cylinder bores. The slower work is compensated for by a multiplicity of machines.

A complete line of bodies will be fur-

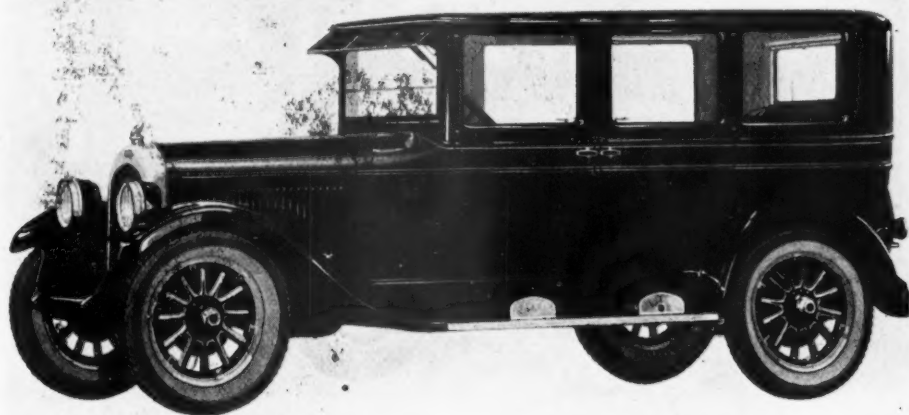
nished for the new car. There are three closed and three open types, one of the latter a roadster with a special gear ratio for which a maximum speed of over 75 m.p.h. is guaranteed. All of the cars are equipped with Lockheed hydraulic four wheel brakes as standard equipment and all are fitted with balloon type tires, 29 by 4½ in. on all but the special sedan which has 30 by 5 in. Both these sizes fit the same rims. The body lines are distinctive due to the impression of length given by the lowness of the car accentuated by the small wheels. Incidentally even the wheels were designed particularly for this car, the short thick spokes being noteworthy.

The cylinder block is cast integrally with the upper half of the crankcase. The cylinder head is a separate casting and contains the combustion chamber which is shaped for high turbulence with a dome above the valves tapering to a clearance of only .05 in. above the piston on the side most remote from the valves. The compression ratio is 4.6 to 1. The crankcase has seven webs or bridges to support the crankshaft bearings. These are integral with the casting.

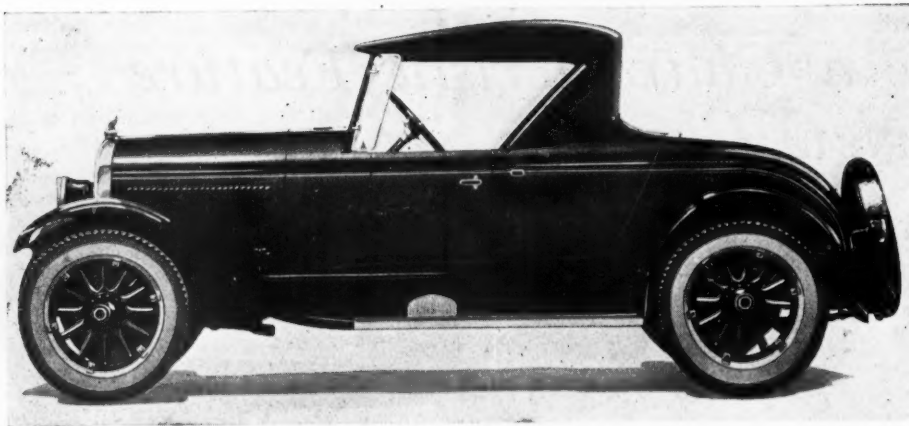
### Lynite Pistons Used

Lynite slotted skirt pistons are employed. These are 3⅞ in. long with .003 in. clearance. Three rings are used all above the pin. The piston pin is seamless alloy steel tubing clamped in the end of the rod and is ¾ in. diameter. The connecting rods are 10 in. long between centers with a lower bearing of 1⅞ in. diameter and 1⅜ in. width.

The connecting rod bearing as well as the crankshaft main bearings are all of the Chadwick type, with the babbitt cast directly in place over a mandrel, elim-



*Chrysler special sedan which is finished in marine blue with mohair velvet upholstery*



The Chrysler roadster which has a guaranteed speed of 75 m.p.h. It is painted a two-tone gray

inating machining or burnishing operations. The main bearings are all given an initial clearance of .002 in. The bearings are the shimless type and with this clearance it is claimed that the usual 500-mile breaking in period is eliminated and that the car can be safely driven at speed when new.

#### Crankshaft Machined All Over

The crankshaft is machined all over and the seven bearings upon which it is supported total  $5/9$  the length of the shaft. The bearing diameters are all  $1\frac{1}{8}$  ins. The lengths are  $1\frac{1}{8}$  ins. front;  $1\frac{1}{8}$  in. number two, three, five and six;  $1\frac{1}{8}$  ins. center and  $2\frac{1}{8}$  ins. rear. The thrust is taken on the rear main bearing.

Morse silent chain drive is used for the camshaft and accessory shaft. There are three sprockets in the train, adjustment being made on the generator sprocket by means of the movable generator bracket. The generator may be removed without disturbing the chains or the sprockets. The camshaft is mounted on four bearings which increase in diameter from  $1\frac{1}{8}$  ins. at the rear to  $2\frac{1}{8}$  in. front.

The valve tappets are mushroom type with chilled cast iron heads welded to a tubular steel stem. The tappets are mounted in groups of six in removable guides. The tappet clearance is .006 in. The inlet valves are chrome nickel steel and the exhaust valves are Silchrome. Both have a diameter of  $1\frac{1}{8}$  in. The stem diameter is  $\frac{1}{2}$  in. and the lift  $\frac{1}{8}$  in.

Lubrication is by pressure to all crankshaft, connecting rod and camshaft bearings. The gear oil pump is driven from a spiral gear on the camshaft. The camshaft, as well as the crankshaft, is drilled for oil passage. The oil passages are contained in the crankcase casting. The normal oil pressure is 25 pounds per sq. in.

#### Operation of Cooling System

Pump circulation is used for the cooling water, the pump being driven by the fan pulley and mounted on the rear end of the fan shaft, at the front of the cylinder block. The pump has six impeller blades. Circulation of the 4-gallon water supply is controlled by a built-

in thermostat at the front end of the cylinder head casting. The water is held imprisoned except for a very small bypass, until the operating temperature is reached at which time the thermostat opens permitting circulation of the water. The water passages around the cylinders are large, the minimum distance across the space between the cylinders being  $\frac{1}{2}$  in. The direction of water flow is controlled by graduated water spaces between the cylinder block and the head to compel equal circulation to all cylinders and valves.

The radiator is a honeycomb design. The fan is a four-blade 16 in. unit driven by V belt. The water temperature in the system is registered on the dash by a radimeter.

#### Remy Electric System

Remy electrical equipment is used for starting, lighting and ignition. The system is a 6-volt, single wire type. The generator has brush regulation. Ignition is controlled by an automatic advance as well as by hand spark lever.

Fuel is fed from a  $12\frac{1}{2}$  gallon tank, mounted on the rear of the frame, by Stewart vacuum tank to a Ball and Ball two stage carburetor, equipped with a centrifugal air cleaner. The intake and exhaust manifolds are cast integrally,

the center portion of the intake manifold being jacketed by the exhaust manifold.

The engine is a four-port type, this design being selected according to the engineers in spite of the somewhat increased manufacturing cost, because of its advantages from the standpoint of distribution. The intake manifold is designed in accordance with the recently favored methods intended to secure high turbulence through abrupt turns and with the characteristics of the passage from the carburetor to each individual cylinder as nearly as possible, identical.

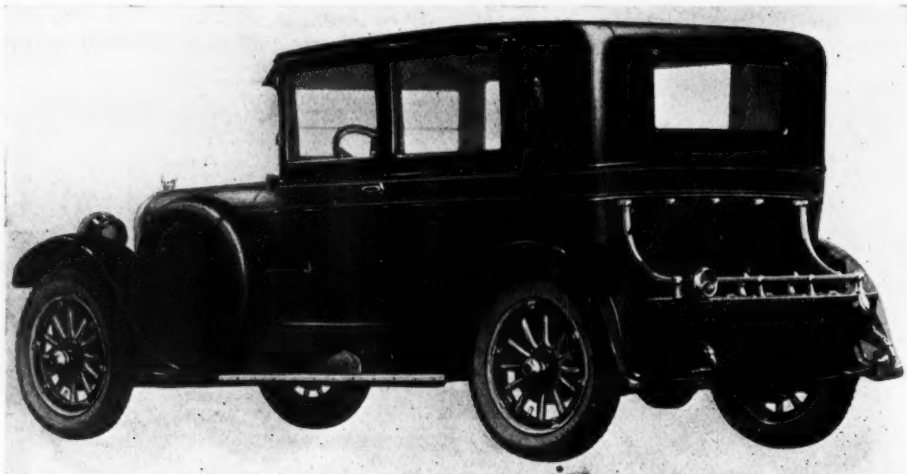
#### Accessibility of Powerplant

Accessibility of the powerplant has been promoted by the use of an intermediate cross member which acts as a sort of spacer between the crankcase and the clutch housing. This banjo-type cross member extends between the side rails of the main frame and both the clutch housing and the rear of the crankcase are bolted to it so that it is possible to take out the engine leaving the clutch and transmission in place, or the engine can be left in place with the clutch and gearset removed. The interior of the engine is accessible when the bottom pan is dropped. The valve tappets can be lifted out as assemblies without disturbing the block and practically the entire engine can be taken apart without taking the block out of the frame.

The clutch is a multiple dry disk unit with five moulded asbestos driving disks and four steel driven disks giving a total of 148 sq. in. friction surface. The teeth on the periphery of the Raybestos fabric driving disks are cut directly in the fabric. The ball thrust throwout bearing is contained in a grease-tight housing. There is a large inspection cover on the housing.

#### Gearset in Unit With Engine

The clutch and three-speed gearset are assembled with the engine and the banjo cross member as explained, as a unit powerplant. The gearset is a three-speed unit with  $3\frac{1}{2}$  per cent nickel steel gears. The clutch shaft is mounted on ball bearings. The spline shaft pilot bearing is a Hyatt roller. The countershaft is



The brougham has a rather novel form of trunk rack. This model is finished the same as the special sedan



stationary. The bushings are bronze. The ratios provided are as follows:

High .....	Direct
Intermediate .....	1.895 to 1
Low .....	3.286 to 1
Reverse .....	4.04 to 1

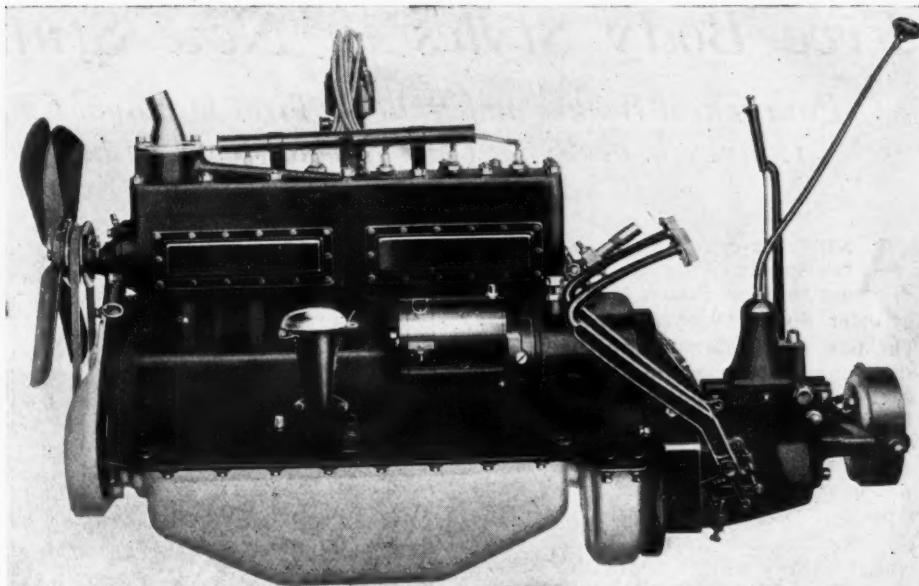
Final drive is by the Hotchkiss system. The drive is taken through two Detroit metal universals and a hollow propeller shaft to a semi-floating rear axle mounted throughout on Timken bearings. The housing is a banjo pressing  $\frac{1}{2}$  in. thick with a removable cover. The pinion is mounted on an adjustable sleeve and on all models has ten teeth. The ring gear on the sedan has 49 and on the other models 46 teeth. The axle shafts are chrome nickel steel, splined into the side gears and keyed to the wheel hubs.

The front axle is tubular, being designed with torsional strength in mind on account of the four wheel brake equipment. The axle is of chrome-molybdenum steel of  $2\frac{1}{4}$  in. diameter with forged spring seats and yokes. The wheel bearings are Timken with ball thrust bearings in the steering knuckle head. The wheels are wood artillery type with disk wheels optional at a slight additional price.

### Hydraulic Brakes Used

The Lockheed hydraulic four wheel brake system is used with external contracting brakes front and rear. The brake drums are 14 in. diameter with  $1\frac{1}{2}$  in. brake bands. The hand brake is also external contracting operating on a drum at the rear end on the gearset. The drum is 7 in. diameter with a  $2\frac{1}{4}$  in. band.

Steering is by worm and nut, semi-irreversible and adjustable for wear. The steering wheel is 17 in. diameter, ebony finish with aluminum spider. The



The banjo housing between the engine and the gearbox makes the powerplant unusually accessible

turning radius is 19 ft. 6 in. The steering knuckle pin axis produced intersects the center of tire contact with the ground as required in four-wheel brake equipped cars.

The springs are semi-elliptic front and rear. The front springs are 35 by  $1\frac{1}{4}$  in. with seven leaves. The rear are 51 $\frac{1}{2}$  by 2 in. with seven leaves on all models except the sedan which has eight. The springs are parallel with the wheels and the rear springs are under the frame at the rear but owing to the taper of the frame are outside the channel rails at their front ends. The spring bolts are  $\frac{5}{8}$  in. diameter with bronze bushings.

The frame is channel construction the

maximum depth of the side rails being 6 in. The stock is  $\frac{1}{8}$  in. and the frame has six cross members including the banjo cross member which acts also as rear engine support.

The bodies are pressed steel over hard wood frame construction. They have high sides and low seats to accommodate the lines. The bodies provided are a standard four-door five passenger sedan, special four-door five-passenger sedan, two-door five-passenger brougham, standard five-passenger phaeton, special five-passenger phaeton and a two-passenger roadster with two auxiliary seats.

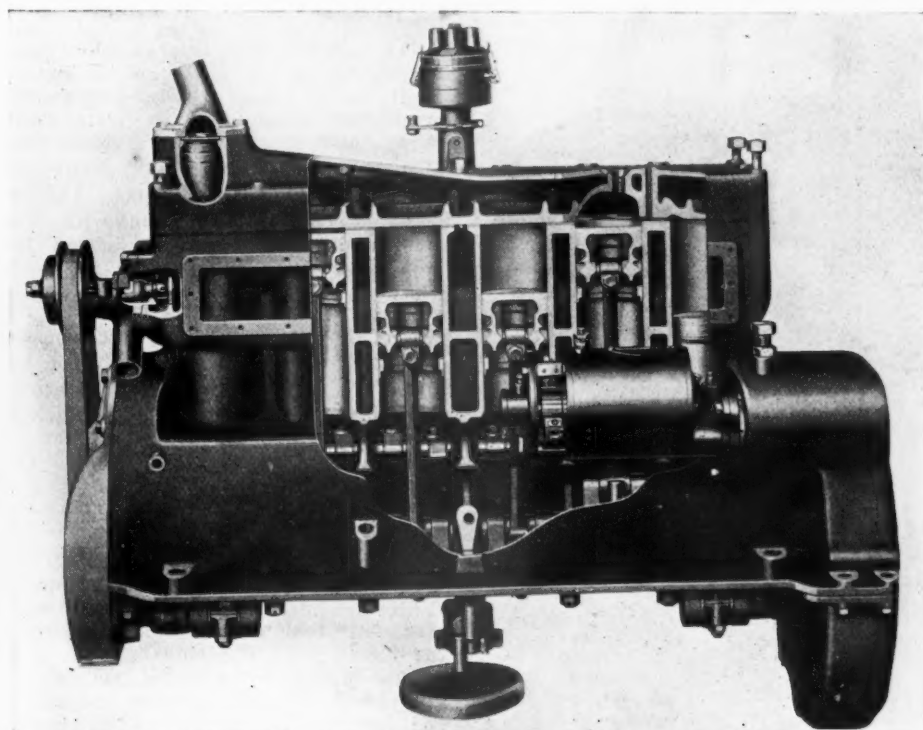
### Unusual Equipment Furnished

Standard equipment includes Zerk chassis lubricating system, Gabriel snubbers all around, transmission lock, flush type ventilator, oil filter on engine, horn button dimmer and special fittings and accessories to accord with the requirements of the various bodies.

The colors are as follows: Standard phaeton black; special phaeton, marine blue with chrome tanned upholstery, roadster two-tone gray with dual tone Spanish leather; standard sedan, black with granite weave upholstery; special sedan, marine blue with mohair velvet upholstery; brougham, same as special sedan.

### WOULD LABEL NATION'S RIVERS

WHAT river is that?" is a question which comes to the mind of the motor tourist frequently on his journeys. but rarely does he find an answer without making a special stop to inquire. It is the aim of the League of American Pen Women to make the nation's rivers better known to the public. Mrs. Grace Goldert, president of this association, is requesting the various state highway commissions to place markers at road-sides which cross famous streams, informing the public as to the name of the body of water at hand.



This illustration shows the large water spaces between the cylinders and the general layout of the engine units



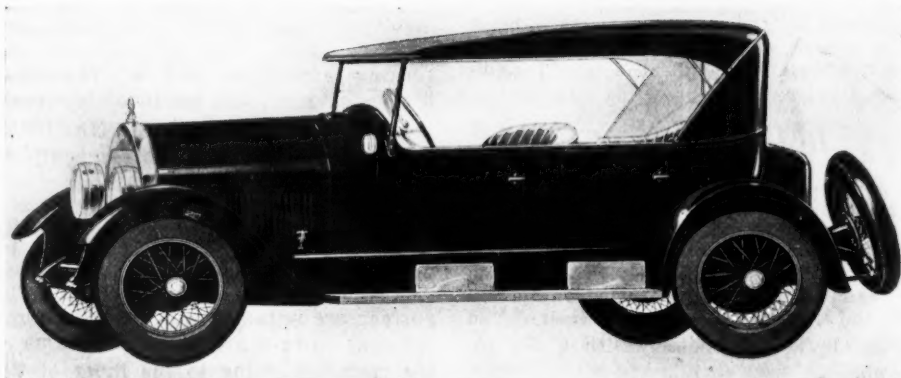
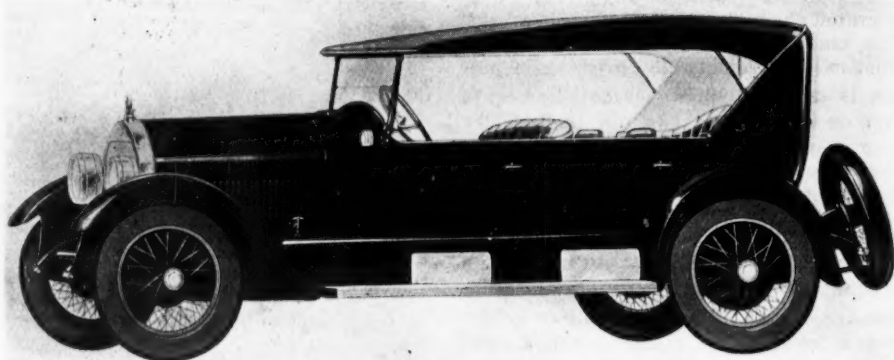
## Five Body Styles in New Stutz Speedway Six

*Four-wheel Brakes and Balloon Tires Optional Equipment. Car Has a 10 In. Longer Wheelbase Than Special Six. Crankshaft Has Three Main Bearings of Shimless Type*

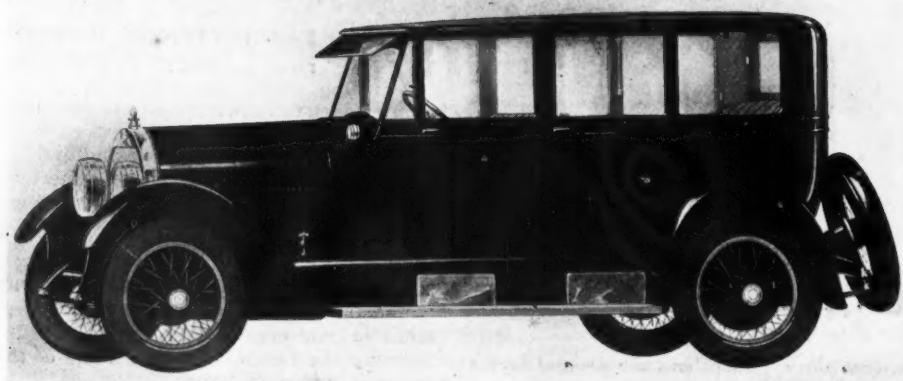
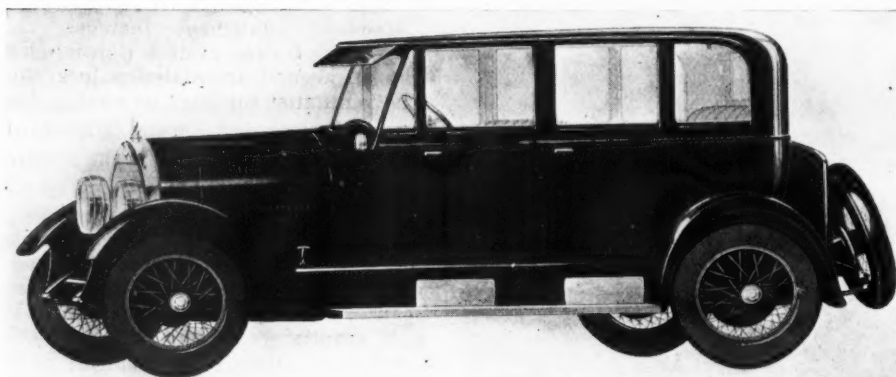
A NEW, six-cylinder Stutz known as the Speedway Six has been brought out as a companion line to the six-cylinder Special brought out last year. The new car is larger than the Special six, being 10 in. longer in wheelbase with a 3½ by 5 in. engine as compared with 120 in. wheelbase and a 3½ by 5 on the smaller six. The 130 in. wheelbase is the same as that in the four-cylinder model which is to be continued. Five body types will be mounted on the new chassis, two being open models and three closed. Four-wheel hydraulic brakes and balloon tires are provided on the new model as optional equipment. Prices are to be announced later.

### Stutz Builds Own Engine

The new powerplant will be built by Stutz in their own factory. The engine is a block cast, valve-in-head type, the 3½ by 5 in. cylinders providing a piston displacement of 288.6 cu. in. The power curve shows a b. hp. of 35.5 at 1,000 r.p.m. and a maximum of 80 hp. at 3100 r.p.m. The compression ratio is 4.45 to 1, providing about 75 lb. per sq. in. gage pressure. The combustion chamber volume is 13.8 cu. in. With 32 by 4½ in. tires and the standard gear ratio of 4.9 to 1, the maximum speed is in excess of 70 miles per hr. on the fully loaded touring



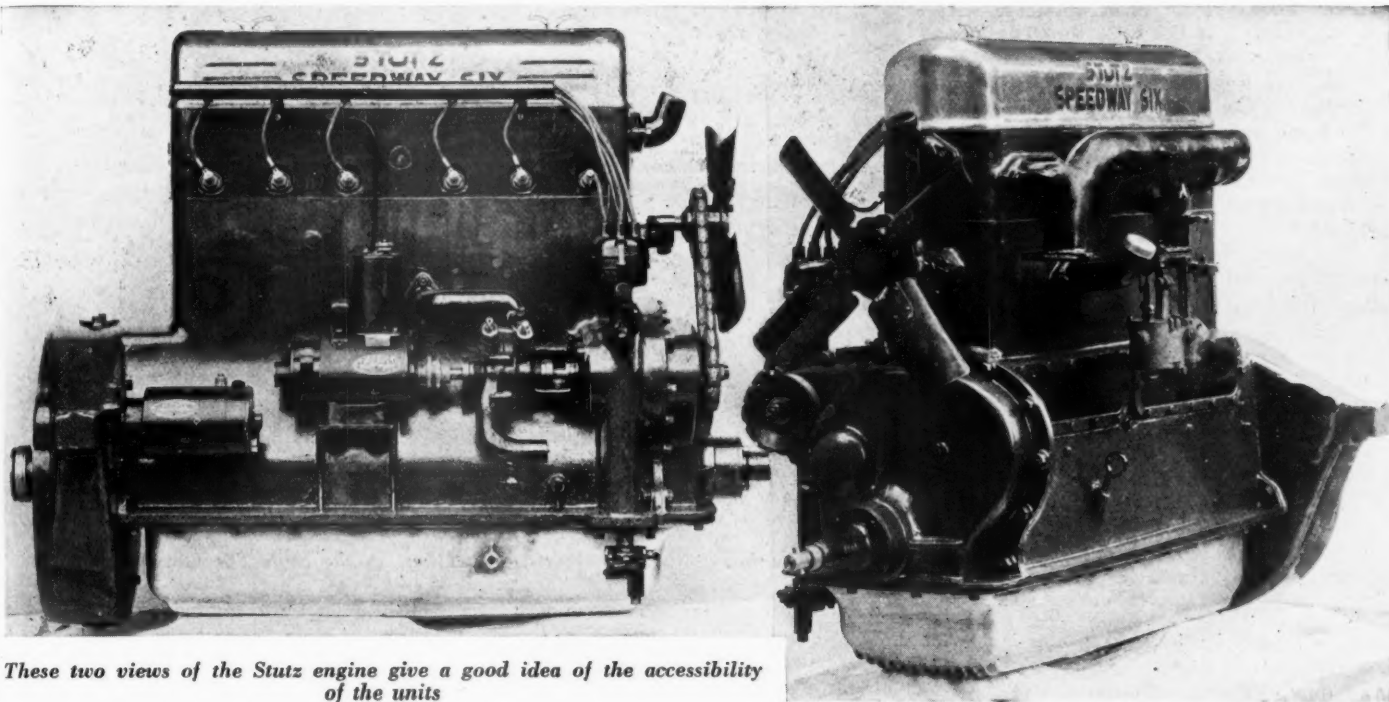
Here are shown the two open models of the new Stutz Speedway Six, the seven passenger, above, and five passenger touring



Stutz five-passenger sport-brougham, top, and the suburban

ing car, according to tests made by the Stutz company on the Indianapolis Speedway.

The cylinder block is a one-piece casting extending 2¼ in. below the crankshaft center. The cylinder barrels are completely surrounded by water with large water spaces in the cylinder head also, to provide cooling fluid around all gas passages and spark plugs. The detachable head is held in place with alloy steel studs evenly spaced around the bores to prevent distortion of the head. The oil pan is cast aluminum and a standard bell housing is bolted to the rear of the crankcase. The cast iron pistons are 3⅞ in. in length, 1¼ in. being above the wrist pin with a ¼ in. crown additional on the piston. The engine is so designed that the pistons are removable from either above or below. The clearance at the top of the piston is .013 in. and at the bottom .003 in. There are six drain holes ⅜ in. in diameter to assist in the prevention of oil pumping. Three of the rings are ⅛ in. and one is ⅞ in., the latter being an oil regulating ring. All four rings are located above the piston pin. The rings are the concentric type and the piston has two oil grooves located 1⅜ in. below and at the piston pin center line. The weight of the piston with the rings and pin is 32 oz. The piston pin is ⅞ in. in diameter made from steel tubing. The pin floats in the piston and in the connecting rod and is



These two views of the Stutz engine give a good idea of the accessibility of the units

provided at its ends with Tobin bronze buttons which bear against the cylinder wall.

The connecting rods are I-beam section, drop forging, 12 in. in length, center to center, weighing complete with the bearing 62 oz. The lower rod bearing is  $2\frac{1}{2}$  in. in diameter by  $1\frac{1}{2}$  in. in length without oil grooves but provided with laminated shims for adjustment. The piston pin bearing in the rod is  $\frac{7}{8}$  in. in diameter by  $1\frac{1}{2}$  in. in length. There is a drilled hole in the top of the rod to provide an oil lead to the piston pin bearing. In assembly, the rods are selected in sets of six, the maximum variation of total weight in the rod when finished not being allowed to exceed  $\frac{1}{2}$  oz., and the weight of the upper ends of the rod is to be alike in all rods of a set.

#### Shimless Bearings Used on Shaft

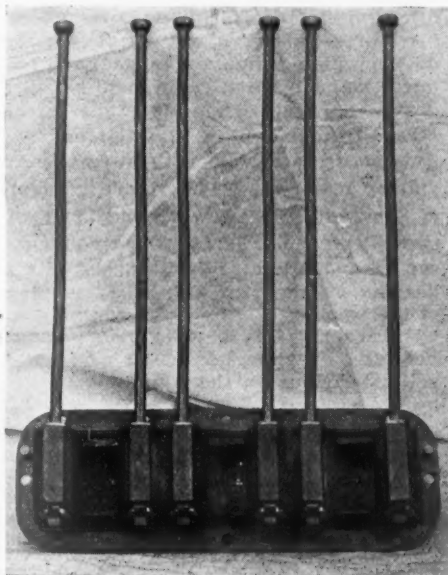
The crankshaft is a three-bearing type mounted on shimless bearings, bronze backed, babbitt lined, without cross feed hole oil grooves. The shaft is  $2\frac{1}{2}$  in. in diameter on all three bearings and the bearing lengths are, respectively, front to rear,  $2\frac{1}{8}$  in.,  $2\frac{3}{4}$  in. and  $2\frac{3}{4}$  in. The minimum cross-section of the rod in the crank cheek is 4 sq. in. The rod is provided with an adjustable thrust at the front bearing to take up end play. The cranks and pins are drilled for oiling the connecting rods. The shaft is counterbalanced with integrally forged counterweights.

Link-Belt silent chain drive is employed for the camshaft and accessory shaft. This is a  $1\frac{1}{2}$  in. silent chain with a  $\frac{3}{8}$  in. pitch. It is a triangular layout with an automatic back type Link-Belt idler inserted in the line to take up chain slack. The chain drive is lubricated from the idler sprocket. The crankshaft, accessory and idler sprockets are of steel. The camshaft sprocket of semi-steel. The camshaft is located on the

left side of the engine and is a one-piece, drop-forging  $1\frac{7}{8}$  in. nominal diameter. It is mounted on three, bronze backed, babbitt lined bearings, of diameter and length as follows: front,  $2\frac{7}{8}$  by  $1\frac{7}{8}$ , center,  $2\frac{1}{4}$  by 2 in., rear,  $1\frac{3}{4}$  by  $1\frac{3}{4}$  in. The tapered section permits the camshaft to be drawn from the engine lengthwise. The thrust on the camshaft is taken on the front bearing and is adjustable. The cams are  $\frac{5}{8}$  in. in width and the shaft is made of S. A. E. 10 point steel.

#### Accessible Tappet Guides

The valves are driven from the camshaft through roller tappets mounted on hollow pins which are cross-drilled vertically to lubricate the roller. The tappets are 1 in. in diameter by  $2\frac{3}{4}$  in. in length. The roller is  $1\frac{7}{36}$  in. in diam-



Tappet guides are on removable plates flanged and dowelled to the outside of the crankcase

eter and  $\frac{3}{8}$  in. wide rotating on a  $\frac{1}{2}$  in. diameter hollow pin. The tappet guides are mounted on removable plates flanged and doweled to the outside of the crankcase, providing inspection openings for the crankshaft, connecting rods, camshaft, etc. The position of the camshaft is such that when these plates are removed the entire bore can be inspected by the use of a small mirror and the condition of the main bearing also inspected. The tappet guides are slotted to hold the rollers square with the camshaft.

The push rods are  $\frac{3}{8}$  in. in diameter by  $1\frac{1}{8}$  in. wall, steel tubing. They have ball and cup ends  $\frac{5}{8}$  in. in diameter, oiled from the overflow of the rockers. During the operation of the engine, oil fills the cup in the top and runs down outside of the rod to the cup in the tappet and overflows through the oil holes into rollers. The rods are enclosed in the cylinder block, thus assisting in keeping the valve stem clearance uniform as well as helping silence the valve action. The valve rockers have a rocking valve stem contact with felt lubricating ring.

The maximum slippage on the valve stem contact is .008 in., or 2.7 per cent of the rocking contact. The length of the rocker arm is 2 in. on the valve stem, and  $1\frac{1}{8}$  in. on the push rod end. The rocker shaft is  $\frac{7}{8}$  in. in diameter, hollow, assembled with three brackets. The rocker bushings are  $1\frac{1}{8}$  in. long and  $\frac{7}{8}$  in. diameter. Pressure lubrication is provided to all of the rockers and the rockers are fitted with the valve adjusting screws. The entire rocker action is enclosed under an aluminum cover.

#### Dual Springs on Valves

The valves are tungsten steel for the intake and chrome silicon for the exhaust. The valves are poppet type inverted in the detachable cylinder head



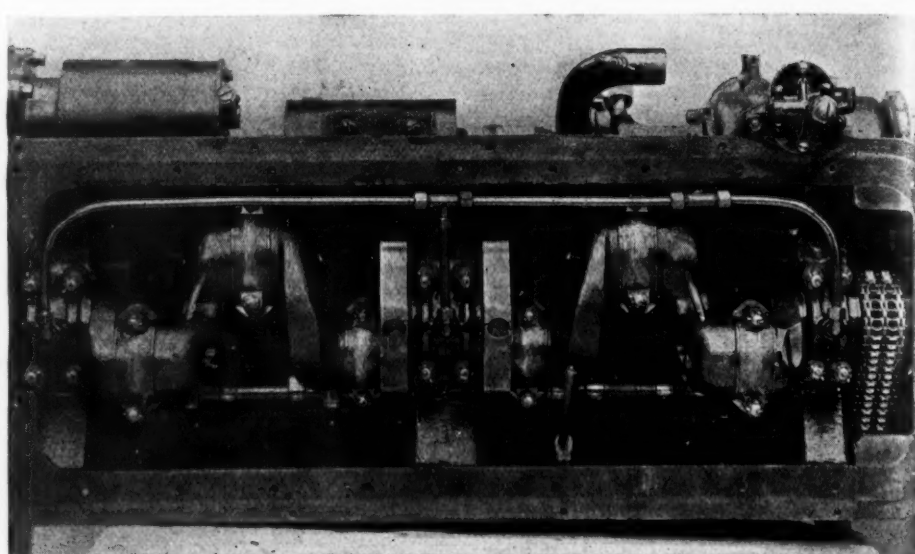
on the center line of the engine. The valves have 1 $\frac{1}{4}$  in. head diameter with  $\frac{3}{8}$  in. stem. The lift is  $\frac{3}{8}$  in. The seats are the 45 deg. type and the valves are fitted with dual springs of 60 to 65 lb. pressure. The firing order is 1-4-2-6-3-5. The cams are zero velocity, constant acceleration type. The valve timing, intake opens 10 deg. late, intake closes 45 deg., exhaust opens 45 deg., exhaust closes 5 deg. late.

The eccentric drive shaft is fitted with spiral gear for driving the oil pump ignition distributor. This shaft has fan pulley and chain sprocket on the front end and the water pump coupling at the rear end. The engine is oiled by positive pressure feed, the oil being contained in the cast aluminum pan which has a capacity of 3 gal. The pan is provided with an anti-splash plate and baffled to prevent the surging of the oil and also with cooling ribs on the bottom. Removal of the pan permits inspection, removal or adjustment of the main bearings, rod bearings, pistons, rods, oil piping, etc. The oil pump is self priming, internal gear type provided with exterior adjustable pressure regulator in the pump cover. The pump and driveshaft is a removable unit mounted on the outside of the engine on the right side and fitted with exterior piping. The pump inlet is elevated 2 $\frac{1}{4}$  in. above the main oil level. The pump runs at one-half engine speed. Removal of the pump cover permits inspection of the pump and regulator. The feed is by pressure through large piping to the crankshaft, connecting rods and through a drilled lead to the camshaft. The oil leads also carry oil to the rocker shaft, chain idler and accessory driveshaft. There are centrifugal oil feed holes in the crank pin on the unloaded side. The cylinders, piston pins and other moving parts are lubricated by spray and overflow. Pressure is designed to be constant at all speeds and adjusted from 15 to 25 lb., independent of the throttle setting.

### Cooling by Pump System

Cooling is by centrifugal water pump driven at  $\frac{1}{4}$  engine speed. The pump is 3 $\frac{3}{4}$  in. six-vane, bronze impeller type located at the center of the engine with two-way distribution in the cylinder jacket. The water pipe has a blind end allowing the water to issue from both sides of the pipe at the blind end. The pump shaft is stainless steel lubricated by pressure storage cups. The pump is driven through an Oldham coupling from the accessory driveshaft. The fan is 16 in. in diameter driven at  $\frac{1}{4}$  engine speed by Link-Belt drive. The fan bearing has a self circulating oil system and is mounted on the front end of the cylinder block. The fan belt length is 36.4 in. with 29 links.

The electrical equipment is Remy for starting, lighting and ignition. The ignition coil is mounted on the generator and the starting motor is the flywheel type with a No. 1 S. A. E. outboard flange mounting on the front side of the No. 3 bell housing. Starting engagement is by Bendix gear. The distributor mounted on the upper end of the oil pump shaft



Mounting of the three-bearing crankshaft in the Stutz Speedway Special

has semi-automatic control and is the Remy closed circuit type.

The gasoline system is fed from an 18 gal. tank mounted with three point suspension on the rear of the chassis through a Stewart-Warner vacuum feed to a 1 $\frac{1}{2}$  in. vertical type Stromberg carburetor. The intake and exhaust manifolds are located on the left side of the engine and cast in one-piece embodying a hot-spot to assist vaporization. There are five vaporization wells in the intake manifold.

### Accessibility Feature of Design

One of the features of the design of the engine is accessibility. It is possible to tear down the entire engine without removing the block from the chassis. As an example of the possibility for removing parts without disturbing any other units, it is possible to take off the following items without disturbing anything else: starting motor, generator, distributor, oil pump, oil pan, carburetor, fan belt, valve rocker shaft assembly, oil filler, oil strainer, oil pump cover assembly, pressure regulator, water pump delivery pipe, exhaust manifold, and carburetor and ignition cable manifold.

The flywheel weighs 65 lb. It is designed to take a 10 in. plate clutch. The flywheel is semi-steel with integrally cut starter gear teeth. The clutch is a Borg & Beck, with specially ground mats and thrust bearing. The transmission gear-set is a Warner with a special Strom bearing on the rear driveshaft in place of the bearing usually fitted at this point by Warner. This gearset also has ball bearings on the main shaft and Hyatt roller bearings on the countershaft.

The drive is transmitted through two Mechanic Machine Co. No. 5 universals and a 2 $\frac{1}{4}$  in. hollow propeller shaft to a No. 5320 Timken rear axle. The torque is taken through a torque arm 54 $\frac{1}{4}$  in. long, center to center, made of 7/64 in. stock. The torque arm anchors at the front end on a cross-member just behind the engine. The drive is through the springs. The spring suspension is semi-

elliptic 38 by 2 in. front, 62 by 2 $\frac{1}{4}$  in. rear.

The Lockheed hydraulic front wheel brake system is provided as optional equipment. The master cylinder for the Lockheed hydraulic system is mounted on the bell housing. The brakes are the external contracting type, the operating cylinders being on each brake in the usual manner. The brake drums are 15 by 2 in. In case the front wheel brake is not desired, the standard internal and external brakes are fitted on these drums. The axles are the Timken type with the usual Timken brake operation. The steering gear is a Gemmer Model N. The tire size is 32 by 4 $\frac{1}{2}$  in. on the open car and 33 by 5 on the closed. Balloon tires, 32 by 6 in., are provided as optional equipment. The standard wheels are the Wire Wheel Corp. of America wire wheel product known as the Model B-5 Houk type. This type has the largest hub provided on wire wheels.

There are eight cross-members, three of which are tubular. Included in the eight cross-members is the bell housing which acts as an efficient member.

### One Chassis for All Bodies

All five body types, a five and seven passenger open and a five and two seven passenger closed types including a five-passenger sportbrohm, a seven passenger Berline and a five passenger suburban are all on the standard 130 in. wheelbase chassis. All of the closed models are four door type. The equipment on these cars includes Stewart-Warner speedometer, Western ammeter, U. S. oil gage and Boyce MotoMeter. The tools are carried in the left front door pocket and on the open cars the side curtains are carried in the back of the rear seat in a special compartment. The open car tops are collapsible five-bow type. The steering wheels are full wood type with the center control. The running boards are full length, made of steel and provided with kick plates. The instrument board is solid walnut. The car has a 9 $\frac{1}{2}$  in. road clearance, the front axle being the low point.



# Packard Single Six Now Fitted With Four-Wheel Brakes

*Brakes Are of Internal Expanding Type and Operate by Cables From Cross Shaft. Long and Short Wheelbase of 133 in. and 126 in. Continued.*

**F**OUR wheel brakes and a number of detail refinements are incorporated in the new series Single Six made by the Packard Motor Car Co. In general, chassis and bodies continue along the lines of the previous series, the outstanding feature being the addition of fully equalized mechanical four wheel brakes. Long and short wheelbases are continued in lengths of 133 in. and 126 in. respectively.

Another feature is the removal of the battery box from under the body and its installation in a metal container which is set into the right front fender guard just ahead of the forward end of the running board. For removal of the battery, an aluminum cover plate is first taken off and the clamps engaging with the battery box handles are then freed.

Instead of removing the terminals from the battery posts short leads which are installed at these points are disconnected at screw terminals which connect with the ground and starting motor lines. This installation has been adopted following the favorable comment elicited by a similar installation on the Straight Eight.

## Bar Type Equalizers Used

Full equalization of the four wheel braking system is obtained by the use of bar type equalizers which are located between the front and the rear operating systems and between the two sides of each system. External contracting brakes with a half-wrap are used at the rear and internal expanding shoes are used at the front axle.

The operating mechanism is proportioned so that 68 per cent of the braking pressure is delivered to the rear end and 32 per cent is delivered to the front end. Brake drums all around are approximately 14 in. inside diameter and the



*The new Packard Single Six, which now carries front wheel brake in addition to those on the rear wheels*

width of the brake lining is approximately 2 in. Emergency or hand braking is accomplished by an entirely separate system, which controls unequalized internal expanding shoes on the rear axle.

Pedal operation is the duplicate of that designed for the Straight Eight with the same combined planetary step-up gear and stop-light switch located on the left side of the gear box, which is also a duplicate of the straight larger installation. Packard engineers state that the planetary gear produces a rapid travel at the end of the operating lever which quickly takes all of the slack out of the entire operating system. Then, as the operating or master lever passes over the top center and approaches the centerline of the connecting rod, its effective arm is greatly shortened producing the high output pressure which is required for easy operation of four brakes. In this way, a light continuous foot pressure brings about in turn, rapid travel

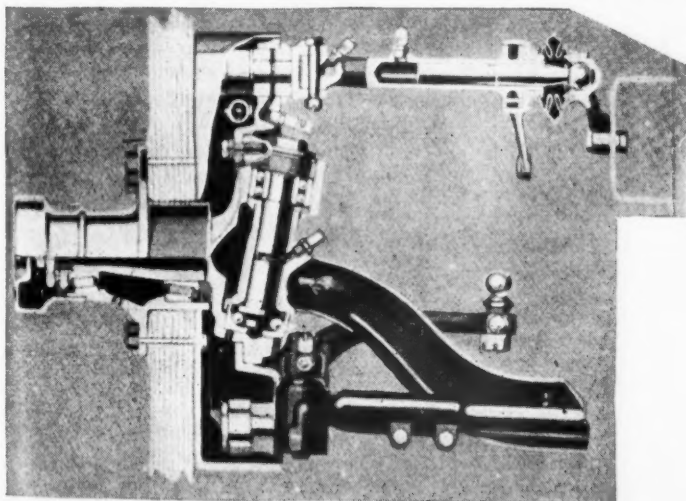
which brings all brakes into action and then high pressures which make for efficiently smooth deceleration.

## Function of Intermediate Lever

A short rod connects the planetary operating lever with an intermediate lever which is centered freely on the left front equalizer shaft, the front equalizer assembly being carried in bearings which are located on the intermediate frame cross member. From this intermediate lever another rod extends backward to one end of the bar which forms the equalizer between the front and rear systems. This bar is fulcrumed at the forward end of a short rod which connects with the center of the rear equalizer bar. The opposite end of the main equalizer bar is somewhat shorter and is connected to the front equalizer bar by a long rod which extends forward.

The front axle brake system is directly actuated by the equalizer bar just described. This bar is supported by forged hooks which are inserted in holes in the lower ends of the equalizer levers. These levers are mounted near the inner ends of two short equalizer shafts that have their bearings in brackets which are riveted to the center cross member. The center bracket is extended downward to carry an adjustable screw stop, which contacts with the center of the forward equalizer bar. As the equalizer assembly is located at the left of the propeller shaft, the right equalizer shaft is somewhat the longer of the two.

At the outer ends of the equalizer shafts and just inside of the frame channels, longer levers are placed and are connected by long cables to the operating levers which are carried at the frame above the center line of the front axle. As the rear ends of these cables are lo-



*Sectional view of one of the front wheel brakes on the Packard Single Six*

cated inside of the cross channels and the front ends are outside, ferules guide the cables through the side channels at about the rear of the front tires.

As illustrated, the operating lever at the front is mounted on a sleeve which is supported at the inner end by a ball stud which is enclosed in a spherical joint forming part of bracket that is bolted to the frame. The outer end of the sleeve which forms the operating shaft forms one fork of the block and trunnion universal joint that transmits the motion through the knuckle centerline to the brake cam.

#### *Helical Spring Retracts Shoe*

Aluminum brake shoes having individual lower supports are actuated by cams which contact with inset hardened steel shoes at the top. Retraction of the brake shoes is accomplished by a heavy helical spring, which is stretched between the shoes at a point just below the cam. The brake shoes are held in place by pins passing through the leg of the T-shaped section of the brake shoe, the brake lining being riveted to the top of the T-section.

These pins are threaded into the aluminum spider which forms the brake enclosure and carries the bearing for the cam and universal joint shaft. A tangential adjusting screw is located at the inner end of the operating sleeve and a threaded adjustment is placed between the forward end of the cable and the clevis which connects with the operating lever.

Straight Eight practice has been followed in the construction of the front axle. The knuckle pin is inclined so that its projected centerline intersects the ground plane near the center of the tread and ball bearings are used to facilitate easy steering. A two row annular bearing is fitted at the top and a single row bearing of the cup and cone type at the bottom.

No provision is made for the release of the outer front wheel during a turn as Packard engineers insist that greater safety is insured when all brakes are operated under similar conditions. To insure greater strength and promote appearance, all wheels are made somewhat heavier and have bolts passing through the inner ends of all the spokes. In accordance with previous practice wood wheels are continued on all models with the exception of the four passenger sport that is equipped with steel disc wheels.

#### *Operation of Rear Brakes*

In the rear, the brakes derive their operation from the rear equalizer which is similar to that used for the front system. The short rod leading back from the main equalizer connects with the center of the rear equalizer which is hooked into the equalizer levers like the front. Instead of the screw and nut stop as used at the front, short projections extend upward and forward from the hubs of the equalizer levers and contact with the rear cross channel when the brakes are released. These stops in conjunction with heavy springs that are connected to the free ends of the rear brake operat-

ing levers, eliminate rattles throughout the entire system.

Short rods connect the operating levers at the outer ends of the rear equalizing shafts with levers located on the rear brake enclosures. Adjustment of the rear brakes is made by thumbscrews. The rear band brakes are fairly conventional in design and are anchored at the back to product a half wrap.

Complete separation of the emergency braking system is assured as a separate linkage connects the hand lever with a cross shaft which is located just back of the rear equalizing shafts. No equalizers are installed at this point and levers at the outer ends of the shaft are connected to the cam levers on the rear axle by short rods. Adjustment is made at the threaded rod ends. The internal construction of the rear expanding emergency brakes is approximately that of the front service brakes.

In accordance with established Packard practice, the hand lever is located at the left of the driver's seat. The intermediate rod therefore is located close to the left cross channel and the cross shaft lever is placed at the extreme left end of the shaft. Heavy springs, anchored on the frame, retract the hand brake mechanism in the same manner as the foot brake linkage is held taut.

In addition to these features, several detail changes have been made, chiefly in body work and one new body type has been added to the line. An interesting development is found in the pressed steel shields which shroud the universal joints for the purpose of protecting the floor boards from flying grease.

#### *Four-Passenger Runabout New*

The former two-passenger runabout has been replaced by a four-passenger

runabout having practically the same body lines. A rumble seat is located under the rear deck of the new car and the capacity is increased for two extra passengers. This seat is upholstered in leather over deep springs and the compartment is fully finished in carpet.

When the cover forming the back of the rumble seat is raised an automatic switch closes the circuit to a lamp which provides continuous interior illumination. Another compartment, in the forward upper portion of the rear deck, provides accommodation for a golf bag or similar article. Access is had through rectangular doors, one at each side of the body.

Adjustable regulators now control the rear windows of the sedan and sedan limousine and Grolan gasoline gages are now mounted on the instrument boards of all models. The instrument board has been rearranged slightly and is now provided with a walnut finish in all models. The diameter of the steering wheel has also been increased throughout the entire line.

With the addition of the four wheel brakes, prices on all models have been revised. With the exception of the runabout, which has been redesigned to accommodate four passengers, the list price on all models has been increased by \$100.00. The increase on the runabout is \$300.00. Prices for the complete line of the new series are as follows:

5-Passenger Touring .....	\$2,585
4-Passenger Sport Model .....	2,750
4-Passenger Runabout .....	2,785
4-Passenger Coupe .....	3,275
5-Passenger Coupe .....	3,450
5-Passenger Sedan .....	3,375
5-Passenger Sedan-Limousine .....	3,425
5-Passenger Permanent Top Touring .....	2,850
7-Passenger Touring .....	2,785
7-Passenger Sedan .....	3,625
7-Passenger Sedan-Limousine .....	3,675

## DAV'S DIARY

DEC. 27—I shure had a swell job last week, i don't think. Gosh, every time I think of it i get soar. If i was to have another one like that handed to me i would say nix. I like my work but when it comes to putting on the gloves with the flew and new Monia excuse me i got another engagement.

Of course i wasent expecting nothing uncomon when the boss sends me out in the country abot 5 miles to fix a connecting rod baring on a Runwell wich was burned out and wich the car couldent be towed in on account of the roads was so bad, but i gess mostly becuz the guy was so tite him thinking about the cost of towing.



Anyhow it wouldent of been so bad except that it was raining when i got out and turning cold and by the time i had laid on my back under that old bus trying to fit a new baring on a out of round shaft with the floor damp and cold and it getting colder every minit my spinal columes was jest about petrified.

I would of quit but the bird was crazy to get the bus running becuz he used it in his bizness so i kep on working like a boob till i was pretty near froze. Its funny how it gets your back when you lay down on a cold floor.

Well i was laid up for a couple of days and felt like a piece of cheese on Christmas and the only thing that was worth while was that my girl came to see me and brot me some swell stuff to eat wich was worth being sick almost if a guy dident feel so rotten.

I got a swell silk mufeler from my girl for Christmas. I know she likes me but i can tell she would rather i was something eltse as a greas hound.



# Novel Type of Propeller Shaft Brake on American LaFrance 21-2 Ton Truck

*Rotating Part of Brake Is Hollow and Has Curved Vanes for Pumping Air for Self Cooling*

A 2½-ton rated capacity truck is now being made by the American LaFrance Company in addition to its 3½ and 5-ton models. The new truck is quite similar to these but has a different and quite novel form of propeller shaft brake. It is fitted with a double reduction instead of the worm gear axle used on larger models, although this axle is so designed to accommodate a worm and worm wheel without material change in the housing if the purchaser prefers the worm drive.

A cast steel disk, with two walls joined by ribs curved to act as the blades of an impeller which pumps a considerable quantity of cooling air, forms the revolving unit of the brake. This disk is splined over the tail shaft of the gearset and is so fitted as to float axially on this shaft. This helps to prevent dragging when the brake shoes are disengaged and insures equal pressure against the shoes when the brake is applied.

By reference to the drawing, it will be seen that the brake shoes are themselves in the form of disks with the center portion cut away to form annular rings. These rings are parted in the horizontal plane and each half is held by three bolts

to a heavy cast ring which is itself carried in a trunnion with vertical axle.

Trunnion bearings are formed in a second pair of ring castings which are hinged at one side to a heavy transverse frame member the forward end of which is bolted rigidly to the gearset housing.

At the other side of the trunnion rings is a toggle which serves to draw the two trunnion rings together when the brake pedal is depressed. In so doing the brake disks are forced into contact with each side of the revolving disk and thus furnish the desired braking effect.

The trunnions, together with a small amount of play purposely allowed at the lunge of the outer trunnion bearing rings, insure an even bearing over the braking surfaces.

Two important advantages are gained from this form of brake construction: effective cooling of the revolving disk through the medium of the air which constantly is circulated through it, and easy removal of the brake shoes when facings require renewal. A large wearing surface also is provided.

Each of the four brake shoes can be removed by taking out the three bolts which attach them to the rings. They are then easily and quickly refaced with

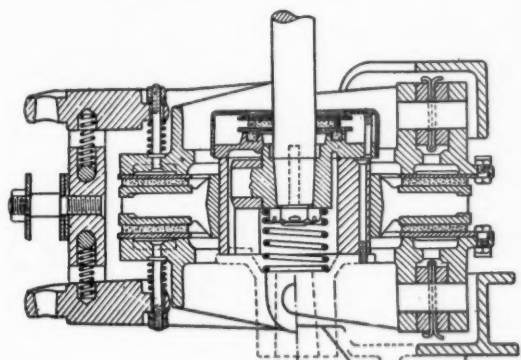
half of an annular ring of asbestos brake material made up into the same form as clutch facings. It is claimed that a good mechanic can remove and replace the shoes in less than a half hour.

Brake shoes are made from high carbon sheet steel to which is riveted the asbestos brake lining. The steel plates seat against a number of lugs which are cast on the rings to which they are bolted and are faced off to give an even bearing against the steel plates. This permits of air circulation on both sides of the brake shoes.

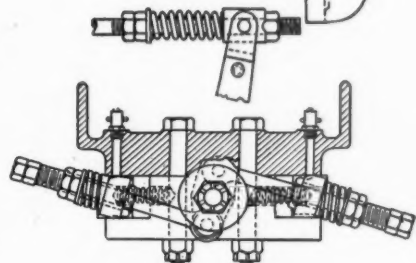
The double reduction rear axle is of quite conventional design, but has some features worthy of note. The housing is a heavy steel stamping made in halves welded together at joints in the horizontal plane. Rings welded inside this casing serve to support the steel tubular extensions which surround the full floating live axles.

Spiral bevel gears are used for the first reduction. The bevel pinion shaft is carried in two Timken bearings and is held in fixed relation to its housing.

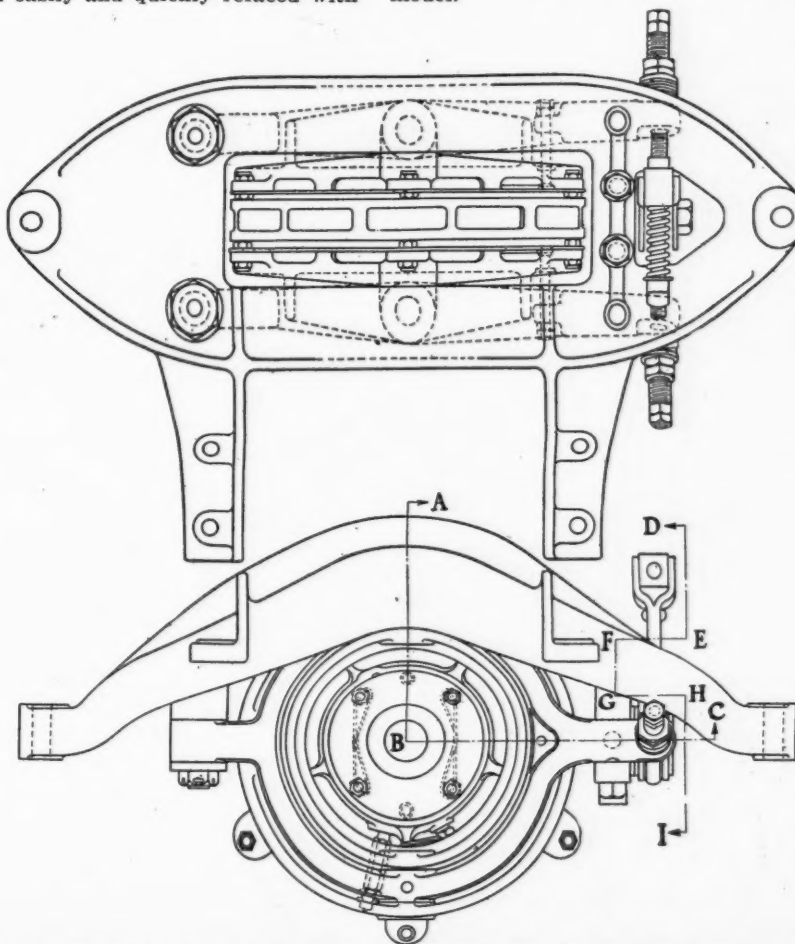
Other parts of the 2½-ton truck are substantially the same as in the 3½-ton model.



SECTION ABC



SECTION DEFGHI

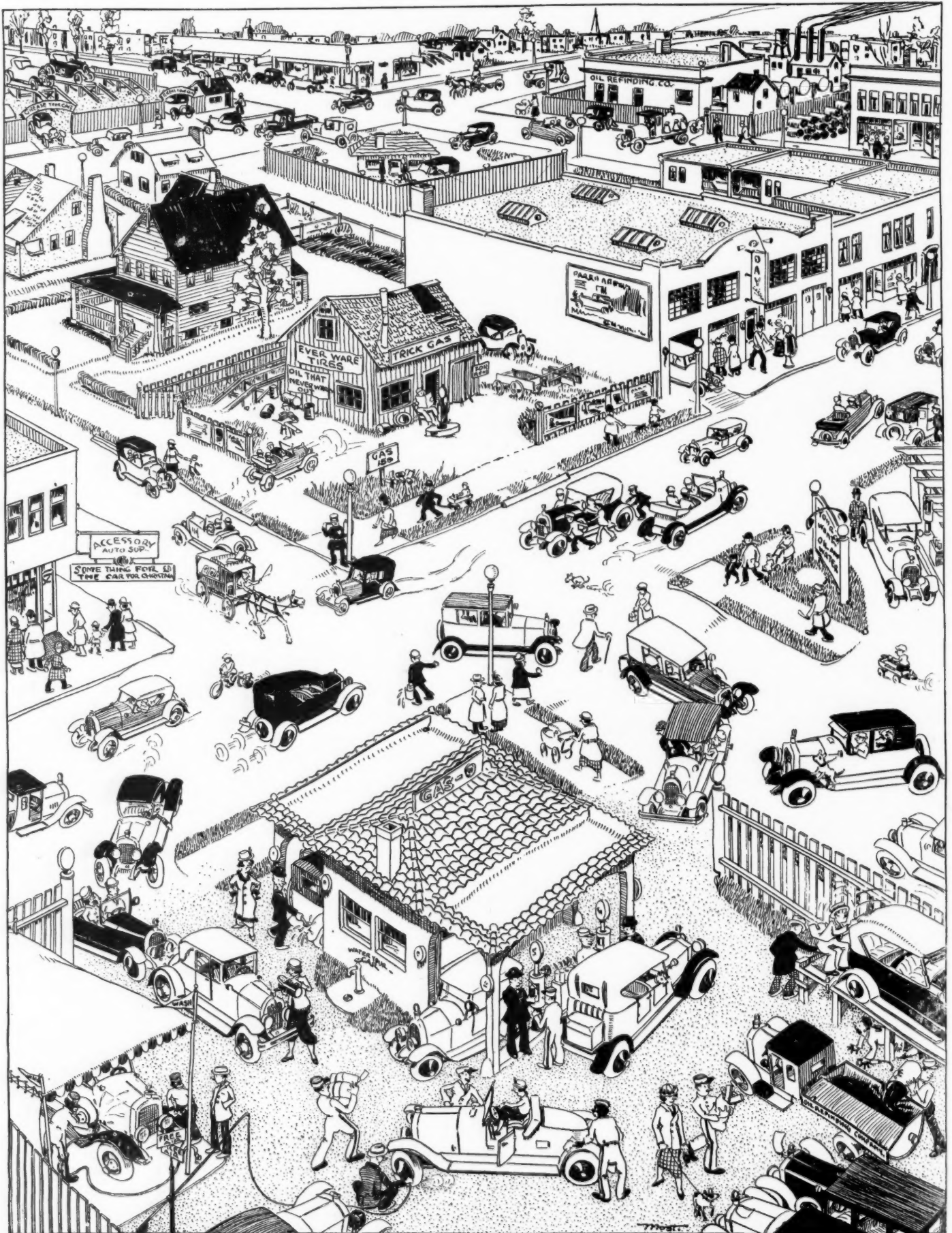


Reference to these illustrations will show that the brake shoes are in the form of disks with the center cut away to form annular rings



# The Gas Age, 1923—Anywhere in the U. S. A.

By CARL MOST



## Bill Fixit's Return

*The Fixit Service Organization Enables Hutch to Sell a Car and Bill Gives a Lesson on Generators*

By A. H. PACKER

Previous articles in this series were published Feb. 15, March 8, May 8, May 3, May 31, July 5, July 26, Aug. 16, Sept. 6, Sept. 27, Oct. 18, Nov. 15, Dec. 6

AUNT JESSICA was making doughnuts. Following the snow flurries that had struck Westville on Christmas Eve a thaw had come and, as Hutch picked his way over the puddles and around to the back door, the fragrant odor gave him one more good reason for calling. The first reason was that he intended to sell Aunt Jessica a Runwell car, but he hoped to break the news to her gently.

"Just in time," said Aunt Jessica. "Have a chair and a couple of these over here. They're cooled off a bit, hot grease is all right for fryin' but not so good for eatin'." "Speakin' o' grease seems like I can't hardly get what I want over at the grocery no more, since you left the store. That fresh feller from over Clark's corners hardly knows the prices, let alone anything about the stuff he's sellin'."

Hutch sparred for an opening. "Been to see the youngsters lately?"

"No, not for quite a spell, train service's so bad an' there's such a sight o' walkin' at both ends, seems like I just put it off an' don't go. S'pose you'll say I could go plum easy if I had one of your cars, but drivin's no job for me, cookin's more in my line."

"I don't know," said Hutch. "Whatever you do you sure seem to do up brown, whether it's cookin' or something else, 'tisin't hard really and you have a warm comfortable car to take you where you want to go, whenever you wish, without the bother of waiting for trains."

"So I s'pose," said Aunt Jessica. "But cars give so much trouble an' when somethin' is the matter a body has to chase all over creation findin' where to get it fixed. Just like trying to get somethin' in one of them big stores in the city, first they send you one place and then back again. 'Liza Higgins was tellin' all about gettin' their Flasher car fixed. Seemed like it jerked somethin' awful. 'Twas all a body could do to ride in it without gettin' shook most to pieces."

"Finally when it got too bad, they took it back where they got it from and was told the trouble was in some part that the car people bought. Seems they didn't exactly build the car, just bought the goods, like, and hemmed it up. They went to some little shop where a man looked at its insides and said his part was alright but that somethin' was wrong under the floor. Then they took it to the other place, where a man came out with a sort of clock with a couple of wires on it, and he said his part was all right but that there was something wrong with the wheels or the whiffle tree—I'm not sure which."

"Upshot of it all was they let her jerk



*Aunt Jessica was making doughnuts and the fragrant odor gave Hutch one more good reason for calling*

back home and haven't used it since."

Aunt Jessica's description of the ordeal through which the Higgins family had passed would have tried the poker-playing ability of a better man than Hutch. He managed, however, to conceal his amusement and when the story was finished he managed to tell of the way the Runwell cars were cared for and how big Bill saw to it that his customers' cars were made right, and how he had all the different departments right in his own shop, so that he didn't have to send customers chasing all over town to try to get some trouble corrected.

The story was simple and had its effect, for behind it all was the honesty and sincerity which had made Hutch a good

grocery clerk before he became a good car salesman.



The shop conference was in session. Valvy wanted to know how you kept taking juice out of the battery for the starter, lights and cigarette lighter without getting it empty some time, but Bill stalled him off long enough for Hutch to tell how he had sold Aunt Jessica a Runwell coach. His story was brief and merely brought home to the shop gang the point Bill had known for a long time, that the best service to the owner was given by the dealer who didn't have to send his customers one place to have the battery charged and to another place for carbureter adjustment.

"Now," said Bill, "since Hutch has the good news off his chest, we will try to work out a little information on how the battery gets filled up by the generator, after everything else on the car has done its best to empty the old black box. Valvy will be glad to get a few tips along these lines and it's just possible that some of the rest of you fellows can pick up a point now and then."

"When we were talking about motors we found that the rotating coils of the armature had magnetism changing in them which, of course, generated a voltage which we called back E. M. F. (electro motive force) or counter voltage. We also found that this counter voltage opposed the battery voltage and made

FIG 1

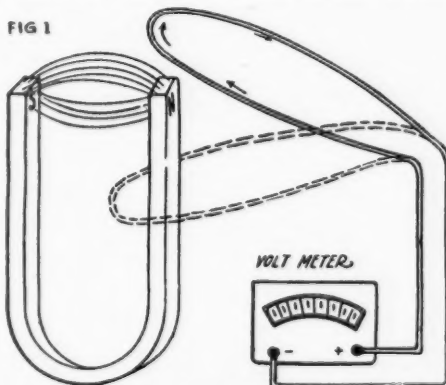


Fig. 1

*A wire moved through a magnetic field generates a voltage*



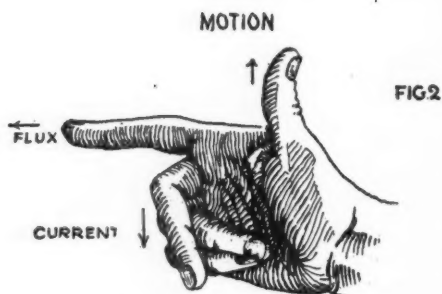


Fig. 2  
The right hand rule for generators

the motor take less current. As the greatest voltage was produced at high speed we also found that the current taken from the battery was the least when the speed was the greatest.

### Generator and Motor Principles Similar

"In our generator we use this same principle except that we run the armature by means of a belt, or a gear, or a chain, instead of by means of current from a battery, but the action of the armature in generating a voltage is just the same.

"In Fig. 1, is shown a magnet, with lines of force represented as going through the air from the north pole to the south. We also have a loop of wire shown in two positions, one represented by the solid lines and the other by the dotted lines and we will assume that this loop of wire is moved rapidly up and down from one position to the other. It will also be noticed that the wire is connected to a voltmeter, so that if there is any voltage generated in the moving wire, it will cause a movement of the needle.

"To actually perform this experiment, it would be well to have a large number of turns of wire instead of the one turn, so as to add up the voltage of a number of turns, as it is necessary to cut through 100,000,000 lines of force a second to generate one volt.

"When the wire is moved down around the S pole to the dotted position, the direction of the induced voltage and current would be as indicated by the arrows along the wire, and if moved upward the direction would be reversed. The downward motion would then tend to move the voltmeter needle, in one direction, and the upward motion would move the needle in the reverse direction. This direction of induced voltage can always be found by using the right hand rule, shown in Fig. 2, this being similar to the rule for motors.

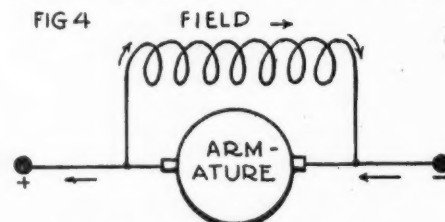
"The difference must be remembered, however, for the right hand is used for generators and the left hand for motors, and if the right hand rule is used for the test in Fig. 1, the arrows will be found correct for the downward motion.

### Constant Magnetism About a Wire Generates No Voltage

"Another thing will be observed in making this test, that the wire when held stationary will generate no voltage, even if in the strongest magnetism, but motion through the field does generate

voltage, and this voltage is proportional to the speed with which the wire is moved. Now as the wire must continue to be moved, to generate, we must devise some way of getting continuous motion, if a practical generator is to be developed.

"In Fig. 3 is shown in a simple form the construction which is used in our automobile generator. The coil is shown as rotating between the poles of a per-



SHUNT WOUND GENERATOR

Fig. 4  
Circuits of a shunt wound generator

manent magnet, in a right hand or clockwise direction, and the arrows in the sketch show the direction of the induced voltage and current. These may be checked by the right hand rule of Fig. 2.

"It will be noticed that the current in the left side of the coil goes in one direction while the current in the right side goes in the opposite direction. It is for this reason that the two curved pieces of copper are used at the ends of the coil, these being in contact with two pieces or brushes which carry the current to the terminals from which it goes to charge the battery, in the illustration shown. These curved pieces which make up the commutator are necessary in all direct current generators, because the current in any individual coil is alternating, due to the reversal that occurs when a wire goes from under the south pole to the north pole.

"In most generators, permanent magnets are not used, a winding or field coil being used instead, and the frame made of soft steel, which is highly magnetized by the coil or coils. The field coils are connected in two general ways, first in shunt or parallel with the armature, one end of the winding going to each brush; second in series with the armature, all of the current given out by the armature going through the field coil. This latter construction called series wound is not

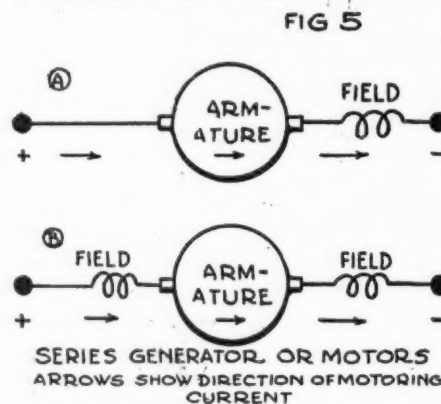


Fig. 5  
The starter has its armature and fields connected in series. The field may be in one winding or separated in two coils as shown

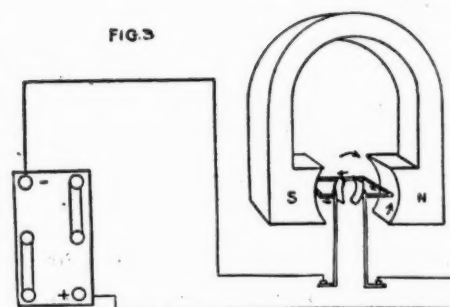


Fig. 3  
An elementary electric generator

used on automobile generators, but is used in the starting motors.

### What the Shunt Field Does

"In Fig. 4 is shown a diagram of a generator, with a shunt field, the field winding being in shunt or parallel with the armature. The arrows show the direction of the currents in the various circuits, and if we assume that the armature is generating 12 amperes, then about 2 amperes would go up through the field winding, leaving 10 amperes to go out to the plus terminal of the battery, or other load to which the generator might be connected.

"In Fig. 5 is shown a series wound machine, which would be used for a starting motor rather than an automobile type generator. Here current from the battery would come in at the plus terminal and at "A" would first go through the armature, then through the field and back to negative battery. At "B" the action is similar except that the field is divided, part at one side and part at the other side of the generator. This is merely a different construction and does not change the idea of the circuits.

"In Fig. 6 is shown a generator with two types of field coils, one being a shunt winding and the other a series winding. This machine is called compound wound. As in the shunt machine, the current from the armature divides, a small amount going to the shunt coil and the rest going out to battery. In returning from the battery, the current goes through the series winding, the effect of which may be either to help or oppose the action of the shunt coil.

"If the magnetic effect of the series winding helps that of the shunt it is said to be accumulative, but if the action of the series winding opposes that of the shunt coil, it is called a differential compound, or bucking series machine. The bucking series is the more common of the two types, because the bucking action depends on the amount of charging current going to the battery, and is used to hold down the current at high car speeds.

"In Fig. 7 is shown a similar compound wound generator, except that the series winding is divided into two parts, one at each side of the armature, while in Fig. 8 is shown a diagram similar to Fig. 7 except that the shunt winding is connected to the plus and minus terminals instead of at the brushes. From the sketches it will be apparent why the connections of Figs. 6 and Fig. 7 are



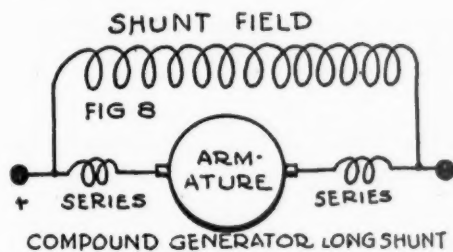


Fig. 6

The compound wound generator has both a shunt and a series field winding

called short shunt, while the connections in Fig. 8 are called long shunt.

#### Direction of Current in Armature and fields

"In Fig. 9 is illustrated a four pole ring wound machine, in which the armature is shown turning right hand or clockwise, the arrows showing the direction of current in the various parts of the circuits. We know that the current will flow from the plus terminal through the field winding to the minus terminal, and if with the right hand we grasp either the S pole or the N pole with the fingers pointing in the direction of the current, the thumb will point in the direction of the lines of force, which at the N pole will be toward the armature, and at the S pole will be in the reverse direction.

"Using the other right hand rule shown in Fig. 2 of this article, we find that the current in the armature reverses under the different poles, which results in all parts of the winding sending current to the plus brushes and from the minus brushes. The two plus brushes are then in parallel to collect and send the current out, and the negative brushes act similarly to bring the current back.

"Referring to Fig. 9, let us see what happens when the generator stops. The wires on the armature are no longer cutting lines of force and, therefore, no longer generate a voltage, and with no voltage, the current in the field windings ceases to flow. The frame of the generator and the pole pieces then lose nearly all of their magnetism, because they are made of iron or soft steel, which does not become permanently magnetic. The slight magnetism that remains is called residual magnetism and is the only thing that makes it possible for the machine to again generate without magnetizing current from some outside source.

"We will now consider what happens when the machine is again started. The rotation of the armature wires in the weak magnetic field generates a very slight voltage, which in turn sends a faint current through the field windings, causing them to slightly increase their magnetic strength. With greater magnetism, the rotating wires generate a greater voltage which again strengthens the magnetizing current in the field coils, and so the rise of the generator voltage continues, and would apparently rise indefinitely, except for the fact that the pole pieces attain a condition of saturation, where further current in the field coils has but little effect.

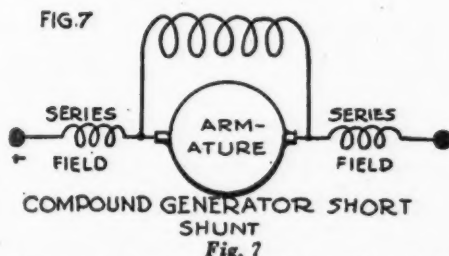


Fig. 7

Compound generator with series field divided into two coils

"On the automobile, the generator is connected to a battery, at about the time that it reaches battery voltage, so that further increase in the output merely increases the charge to the battery, the connection of the battery to the generator serving to maintain the field voltage at a nearly constant value.

#### The Battery Affects the Generator Action

"To understand the automobile generator, and the reason for the control systems in use today, it is practically

4-POLE SHUNT GENERATOR, RING WOUND ARMATURE

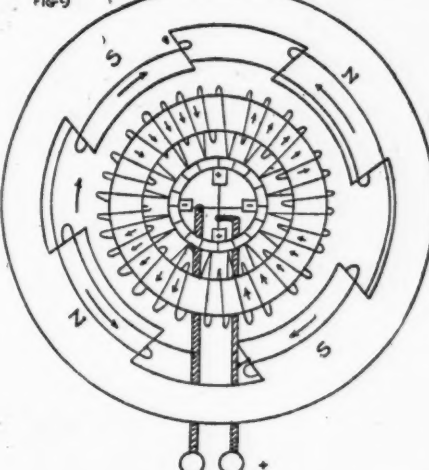


Fig. 9

Direction of the currents and polarity of fields in a four pole ring wound generator

necessary to have a fair idea of the action of the storage battery, which stores the energy supplied by the generator, and gives it out again when needed by the starter, lights or horn. You may at some time have been given the impression that a battery stores electricity, but this is not the case, as the passage of electricity through the battery merely changes the chemical nature of the battery plates, and when current is allowed to flow from the battery the plates change back again.

"Assume for a minute that when we burn a board and produce heat, that it would be possible to collect the smoke, ashes, etc., and by applying heat to them recover the board again. This in a sense illustrates the action that occurs in the battery, for we have two sets of plates, one the positive made of lead oxide and the other the negative made of spongy lead, and we merely allow these to "burn" or be affected and changed by the sulphuric acid in which they are placed. In discharging, the material on

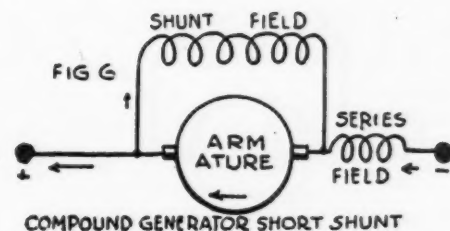


Fig. 8

The long shunt connection for a compound wound machine has the shunt field connected at the terminals

both sets of plates changes to lead sulphate and at the same time the cell shows a difference of about two volts, which difference is used to send a current to some outside circuit.

"To reverse this discharge action which changes the plates into lead sulphate, it is necessary to send current through the battery in the reverse direction from the way it flows when lighting the lamps or operating the starter. This drives the sulphate out of the plates, and restores them to their original condition. From the above action it is easy to see that on discharge the acid in the battery will become thinner and more like clear water, as the heavy portion is absorbed by the plates, and that conversely as the plates charge up and the acid is driven out, the solution will again become heavy, and as objects float higher in a heavy liquid than in a light one, it is possible to tell the condition of charge of a battery by the height that an object floats in the liquid or electrolyte.

"A hydrometer is, therefore, one of the best ways of checking the condition of charge of a battery, for it draws up a sample of the acid from a cell and allows a bulb of glass to float in the liquid, and by marks on the float it is possible to read the heaviness or gravity of the acid. The hydrometer reading for a fully charged battery should be about 1280 which means that the acid is one and twenty-eight hundredths as heavy as water, and when the battery has discharged until the gravity is down to 1150 it is considered advisable to stop and have the battery recharged.

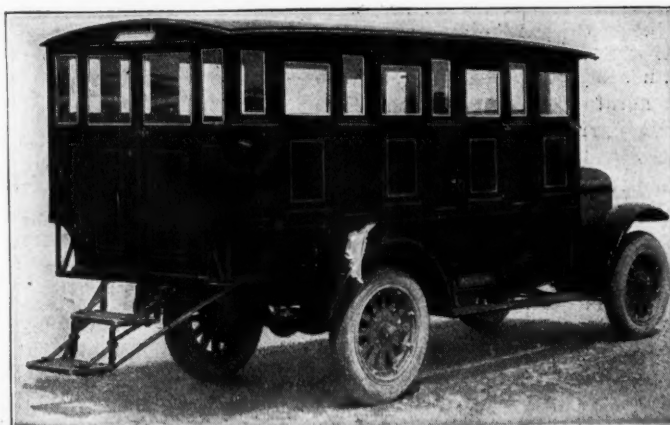
"From the generator standpoint, another condition is perhaps more important than the change in gravity, for a discharged battery will maintain a voltage of about six while being charged, even when taking an abnormally heavy current, while a battery that is in a charged condition, even if showing a voltage of but six, will immediately rise to about 7.5 volts as soon as the generator begins to pump current into it.

"Either a charged or discharged battery, however, acts fairly well as a sort of reservoir into which the generator pours whatever current it generates that is not required by the ignition or lamps, and it is this property of the storage battery that makes satisfactory operation of the electrical system possible, for without the battery, the generator voltage would vary with every change in car speed, burning out the lights at high speed, and causing them to be dim when going slowly."

# MOTOR AGE'S PICTURE PAGES



*Jack Earl, 17 years old and eight feet three inches tall, is one of those fellows who can't sit on the top deck of a motor bus but then he has his own Star*



*International Harvester Co. Motor, the back compartment of which can be used for passengers and, with seats folded out of the way, for transporting freight*



*The winning poster design for the 1924 Philadelphia Automobile Show, to be held Jan. 12-19, for which James Haffey, a bellboy, was awarded \$150 by the Philadelphia Automobile Trade Association*



# OF AUTOMOTIVE INTEREST



*This American expedition into the Gobi Desert in Mongolia discovered Dinosaur eggs ten million years old. (We had one for breakfast this morning.) Dinosaurs, you know, were something on the tractor order in the stone age*



*For shoppers is this electric chair, the invention of J. E. Haschke, Los Angeles, Calif. Wonder what chance one would have on foot during the Christmas rush if the ladies all had these?*



*This envelope speaks for itself—read it*



*The Starkey Transfer & Storage Co., Sacramento, Calif., have hitched their wagon to a star which is in the form of a tractor and put a number of them to work in their city with great success*

# MOTOR AGE

Reg. U. S. Pat. Off.

Vol. XLIV

Thursday, December 27, 1923

No. 26

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## Flat Rate

IN a recent talk before the N. A. C. A. truck makers' advertising managers, Ezra Clark gave some figures that are of more than passing interest to the flat rate student. On a recent list of 305 vehicle manufacturers (cars and trucks) Clark had compiled figures as to how many made individual parts and how many bought stock parts. Here are some of the figures:

Unit	Manufacturer Makes Own	Made by Parts Maker
Engine .....	101	204
Carbureter .....	11	294
Ignition .....	2	303
Clutch .....	70	235
Transmission .....	97	208
Rear axle .....	83	222

These figures certainly clarify the flat rate situation to a considerable extent. First, they show quite clearly that while there are 305 or more manufacturers of vehicles using carbureters, there are only 11 carbureters manufactured by them and that in addition to the stock carbureters which the average shop must be more or less familiar, there are only 11 carbureters individual to vehicles that must be studied.

In the matter of engines. There are 204 vehicle manufacturers who are using stock engines, and the

stock engine list is a comparatively short one. Then if you will analyze the 101 engines made by vehicle makers, you will find that there are not many types, but that these 101 engines will assemble themselves into groups.

And so it goes with the other items. The number of vehicles really has little to do with the number of flat operations that will have to be scheduled to make the schedule of operations complete.



1923—It certainly was an automotive year.



## The Transportation Store

WE must extend our congratulations and our best wishes to C. E. Gambill of Chicago, Vice President of the National Automobile Dealers' Association, who has recently become an evangelist for better dealers. Gambill, as befits the important office that he holds, is offering advice to dealers. This advice is taken from his own experience and if any dealer is to be a follower instead of a leader, we suggest that he pick some man like Gambill as his leader.

The exact point on which we wish to congratulate Gambill is contained in a recent message he gave to dealers through an N. A. D. A. Bulletin. In this Bulletin he advises strongly that the dealer become a COMPLETE AUTOMOTIVE TRANSPORTATION MERCHANT. MOTOR AGE, as all readers know, favors this idea very strongly.

This is an obvious but often ignored suggestion. Gambill's idea is that when a dealer sells a car he creates a market that has as great, if not a greater, profit potentiality than the sale of the car itself and that the dealer should cash in on this market instead of letting Tom, Dick and Harry get it.

Gambill's suggestion is that in 1924 every dealer strive to make a 5 per cent profit on his turnover. Now that simply is not done if the dealer's only source of profit is in the sale of new cars. The only way to get such a profit is to make other departments of the business pay a profit. The sale to the pleased car customer is the idea.



And now for a bigger and better year—1924.



## Associations

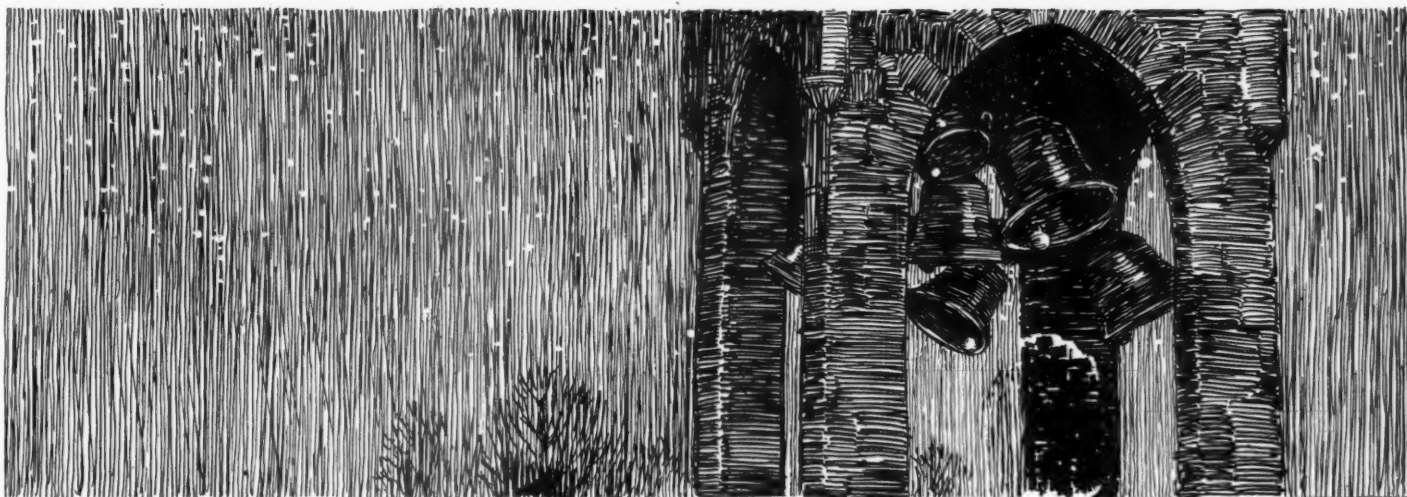
WHAT is your association going to do in 1924?

Of course you are going to put on a show. That is to be expected, but in the last analysis show work is such a small part of association work possibilities. It certainly is a pity that so many dealers and association managers see in the show the ultimate of association work.

The show appeals to the first thoughts. The profits from the show and the sales to the prospects gathered there, look big at the moment but the association that is not doing something for its members that benefits them every day in the year, has simply fallen down on his job.

Think it over.





### When the New Year Bells Ring

**N**OW that we have had a Merry Christmas, the big event in front of us is New Year, and when the bells ring out at midnight, it will be time for every loyal maintenance man to think over the resolutions that he is going to stand by for the year 1924. Maintenance needs some resolutions not nearly so badly as a good many persons would have us believe, but it does need the influence of the thought that maintenance is going to be better and better.

We wish it possible that we could unearth some person like this man Coue who swept a lot of people off their feet some months ago with an age-old theory of being physically better. What maintenance needs more than anything else is to convince the people generally that we are as good as we are. We do not need any untrue propaganda, any bunk sales talk or anything of that sort, but just a decent, honest appreciation of how good work our boys can do.

We do not know of any craft that has such a variety of opportunities for pitfalls as this automotive maintenance business. Just at present there are something more than 100 models of automobiles being made, and these models change from one trinket to another in midseason. The list of models covering 10 years is appalling, and no one of these is just like another.

Into these models have been put the brilliant designs of engineering experts in many industries, ranging from the age old metal craft, through woodworking and textiles to the more modern arts of electricity, heat treatments, the feats of metallurgy and so on. The automobile represents the peak of mechanical accomplishment and along with these, it carries a few mechanical and engineering blunders.

And the maintenance man is supposed to know all of the good and bad twists and curves of this combined art and to stand by in his overalls and pass on them even more readily and business like than did the transportation maintenance men of a generation ago—the wheelwright and the blacksmith.

Did you ever stop to think just how recently it is that these two craftsmen of ages and ages of development were being criticised by people who owned the individual transportation of those days? It has been a big jump in the amount of knowledge required for the job as well as in numbers of men required to keep the wheels going round and round. Those of you who have lived over this span from the blacksmith shop to the automotive maintenance shop have witnessed the most important development in the history of the world since the day when the wheel was invented or

discovered—which ever it was.

But to get back to the resolutions. What we want to suggest is something like the following:

#### **DURING 1924 I WILL BE**

More courteous to all with whom I come in contact, be that person a customer or a helper

More outspoken as to the frauds that are attempted in the name of automotive maintenance

More energetic in spreading the gospel of a fair overhead and the right of every shop man or mechanic to a just wage

A better friend of the flat rate system of selling maintenance

Studious as to methods of making shop work more efficient in order to save the customer money

An evangelist in an effort to make vehicle owners realize that the first mark of efficiency is cleanliness.

A supporter of honest equipment and will endeavor to convince customers that this equipment is to his advantage both as to price and quality of work

One of those who makes a fair charge for his work and will collect every cent that is due to me

One of those who will decline to guarantee work that I know is not sufficient for the occasion and I will give the customer a fair warning that what I am doing is merely a makeshift repair to help him out of trouble

One of those who will insist at all times that maintenance mechanics are men among men, craftsmen of a higher order and that most of their failings are due to a mistaken effort to please customers who insist that they know more about it than the mechanic.

A year ago we printed an editorial with the headline "1923 The Maintenance Year." We have just read this again. While some of the developments set forth for the year in that editorial have been somewhat disappointing, the general result has been satisfactory. Definite progress has been made and we expect to continue the progress by refining the great human-industrial machine that has been gathered for this work.

We do not expect any great revolution in maintenance, it does not need it. But we do expect much refinement here and there. We expect more efficiency and more speed and perhaps less weight—rather fewer number of men in the work. We expect the volume of business to be leveled, just as we expect vehicle owners to use their cars more evenly. These things will make for the benefit of the good craftsman who is willing to both work and study and will mean the elimination of those who have eyes only for an easy berth and pay-day.

# Over 4,000,000 When 1923 Closes

## Production Up to Nov. 30 Is Approximately 3,723,000

### Open Weather in Certain Sections Is Strong Sales Impetus

NEW YORK, Dec. 24.—That total production of automobiles and motor trucks for the year now closing will be in excess of 4,000,000 is indicated by the activity in producing centers during December. Output for the eleven months ended Nov. 30 approximated 3,723,000.

While operations have been curtailed in many automobile plants due to inventory taking and readjustment of manufacturing facilities, they have been maintained at a good rate in others which will result in a relatively high aggregate output. There has been a tendency on the part of major producers to shorten the inventory period this year so that there would be as little interruption as possible. December totals will compare favorably with other months of the present year and will show a substantial increase over December a year ago when production reached 228,252.

Open weather in sections of the country has acted as a strong sales impetus, keeping demand at a higher point than was expected at the beginning of the season. Sales show unusual strength for the period which may be accounted for not only by the mild winter but because of the greater holiday buying of automobiles. Improvement in sales is expected to follow the holding of the New York show next month and at the same time manufacturers will be ready to swing toward capacity production.

Parts makers are passing through the inventory taking period, but are reducing the time when plants are actually shut down. Specifications from motor vehicle builders call for steady operations without any evidence being presented that manufacturers are pressing the parts makers, as was the case a year ago. No departure is being made from original delivery specifications, this reflecting a more stabilized condition throughout the industry. The parts branch is operating on a sound, healthy basis, with prospects for a continuance of good conditions for the first quarter of the new year, at least.

### PREDICT 3,500,000 CARS IN 1924

NEW YORK, Dec. 24.—Consensus of opinion among the members of the Motor and Accessories Manufacturers' Association who replied to a questionnaire sent out by General Manager M. L. Heminway estimates 1924 production will be approximately 3,500,000 cars and trucks. The replies show wide divergence. Less than 5 per cent holds out hope for a production in excess of 4,000,000, the 1923 total; about 20 per cent look forward to a maintenance of that production for the

year, while another 20 per cent expect a drop to approximately 3,000,000. The big majority named 3,500,000.

### NEW TEMPLAR ORGANIZATION

CLEVELAND, Dec. 24.—T. L. Hausman, president and general manager of the Templar Motor Car Co., recently taken over by him and his associates, has completed his organization by the appointment of the following executives: Thomas O. Gibbs, president of the Acme Packing Co. and treasurer of one of the subsidiaries of the United States Steel Corp., secretary and treasurer; Frederick P. Nehrbas, formerly vice-president of the Weidely Motors Co., in charge of operations; F. L. Edman, formerly associated with the Transport Truck Co. and the Republic Motor Truck Co., advertising manager; Ralph C. Chesnutt, formerly with the Willys-Overland Co. and the Packard Motor Car Co., chief engineer; M. C. King, formerly assistant purchasing agent of the Chandler Motor Car Co., purchasing agent. President Hausmann will personally supervise sales.

### TIRE PLANTS REDUCE WAGES

AKRON, O., Dec. 24.—Further reductions in wages in some departments of the Miller Rubber Co. have resulted in a strike on the part of calendar men, which according to company officials, will not materially interfere with the operation of the plant. Reductions in wages amounting to about 10 per cent have been accepted by the tire builders and finishers of the Goodyear Tire and Rubber Co. The reductions in wages are part of a more or less general program to decrease production costs in the tire factories. Reductions in selling costs are part of the economy program of 1924.

### FORD NOT A CANDIDATE

WASHINGTON, Dec. 24.—Henry Ford has undertaken to definitely eliminate himself from consideration as a presidential possibility by issuing a formal statement declaring that he would not be a candidate. He placed himself on record as favoring the nomination and election of President Coolidge, stating that he considered Mr. Coolidge a "safe president."

### TO REORGANIZE TRUCK COMPANY

LIMA, O., Dec. 24.—A reorganization committee has purchased the property of the Gramm-Bernstein Motor Truck Co. from the receiver and will transfer it to a new corporation to be known as the Gramm-Bernstein Truck Corporation.

### FLINT INCREASED \$100

NEW YORK, Dec. 24.—After a conference with the dealer organization, Durant Motors, Inc., has increased the price of the Flint \$100. This increases the list on the phaeton from \$1195 to \$1295, other models also being advanced.

## Trucks Surely Helped Santa Out in Chicago

CHICAGO, Dec. 26.—Motor vehicles came to the assistance of Santa Claus in Chicago this year and enabled him to accomplish a remarkable feat of delivery of Christmas presents. By means of a fleet of 346 motor trucks, purchases made at Marshall Field & Co. up to 6 p. m. Christmas Eve were delivered before Christmas morning throughout Chicago and to 90 suburbs within a radius of 40 miles. The company estimated that on the day before Christmas its trucks traveled 12,000 miles.

### RECEIVER FOR ENGINE MAKER

BUFFALO, N. Y., Dec. 26.—An involuntary bankruptcy petition was filed Dec. 22 in the United States district court here against the Herschell-Spillman Motor Co. of North Tonawanda. Three creditors asked that a receiver be named for the firm, which manufactures engines for a number of automobile producers.

The petition says employees of the company have not been paid for two weeks and are threatening acts of sabotage. Assets of the firm are estimated at \$2,000,000. The liabilities have not been estimated.

Harold D. Wilson of Buffalo was appointed receiver.

### TO ESTABLISH LIENS

BOSTON, Dec. 22.—Dealers in motor cars and trucks, and garage owners who have never been allowed to sell motor vehicles for unpaid bills covering repairs, storage, fuel etc., have found a champion in Senator George F. Austin, of Somerville, who has prepared a bill for the 1924 legislature which provides for remedying this defect in the laws. In other lines liens may be placed upon goods. But motor vehicles have been exempt so far.

### GARDNER REDUCES PRICES

ST. LOUIS, Dec. 26.—Gardner Motor Co. has announced reductions of \$60 to \$100 in its various models, making the new list as follows:

	Old price	New price
Roadster .....	\$ 995	\$ 895
Touring .....	995	895
Radio Special .....	1155	1095
All-season touring .....	1095	995

The new prices are effective Jan. 1.

### INTOXICATED DRIVERS JAILED

BALTIMORE, Md., Dec. 22.—Records of the local Traffic Court for the first 11 months of this year show a big increase in the number of persons sent to jail for driving automobiles while intoxicated. The total reached 158, most of the terms being for 30 days. During the 12 months of 1922 the total was 24.



## R. E. Olds Warns Against Too Liberal Time Payment Plans

### Head of Reo Company Declares Too Much Credit in Retailing Is Bad for the Country

DETROIT, Dec. 24.—R. E. Olds has been chairman of the board of the Reo Motor Car Co., having resigned as president. R. H. Scott, who has been with the Reo company since its organization in 1904, was elected president and general manager. For a number of years he has been a director and vice president. H. T. Thomas, chief engineer, was elected vice president.

DETROIT, Dec. 21.—A warning against too much credit in the retail end of the automobile business was sounded by R. E. Olds, president of Reo Motor Car Co., in addressing the nineteenth annual meeting of Reo stockholders this week. He has been called a pessimist for his attitude, he said, in not countenancing the partial payment plans that some of the automobile makers in the country have adopted.

"I believe that the plan is dangerous and a menace to the business," said Olds. "I further believe that eventually this plan will prove to be bad for this country. The automobile industry has become of such tremendous importance and of such gigantic proportions, that anything that affects it affects the welfare of the country as a whole."

Olds declared the Reo Motor Car Co. will not be a party to such a plan and that it has no finance organization to make such a plan operative. He contended that it is not the aim of Reo to make all the automobiles or trucks in the world, but to make what its plants can make comfortably and well, with an eye to good workmanship, man-power, comfort and high standards, and a high grade product. He maintained that keeping up the Reo standards is the company's aim rather than great production volume and huge profits.

In the absence of R. S. Rueschaw, sales manager, Clarence Triphagen, assistant, gave a short resume of work in the sales division during the year and outlook for 1924. Good feeling exists everywhere in the Reo sales organization over prospects, he said, and dead spots in the northwest, central west and south are starting to produce business. The company now has 146 distributors, 800 dealers, six factory branches in the U. S.

### SHEBOYGAN DEALERS ORGANIZE

SHEBOYGAN, Wis., Dec. 24.—Directly as the result of the success of the recent automobile show conducted by dealers of Sheboygan, and the beneficial influence the temporary community of interest developed, the local dealers' association which has been dormant for several years has been revived and a reorganization effected. At a meeting of exhibitors to hear reports from the show committee, it was decided to form a new organization, to be known as the Sheboygan Automotive Dealers' Association, which will become a part of the Wisconsin state association, and will conduct an annual show.

ization, to be known as the Sheboygan Automotive Dealers' Association, which will become a part of the Wisconsin state association, and will conduct an annual show.

## Motors Add \$200,000,000 to Railroad Revenue in Year

DETROIT, Dec. 21.—Railroads of the United States in the year closing will have handled 540,000 carloads of assembled automobiles and 210,000 carloads of parts and tires, said J. S. Marvin, general traffic manager of the National Automobile Chamber of Commerce, opening the conference of freight traffic managers of the industry held here this week. The railroad revenue on this traffic is estimated at \$200,000,000.

More than 1,000,000 have been driven over the highways to destination by dealers, and 80,000 shipped by boat.

### NINE BUICK DEALERS IN CONTEST

ST. LOUIS, Dec. 24.—The nine retail Buick stores in St. Louis started on a sales contest Dec. 16 which will continue until May 15. Announcement of the contest was made at a dinner given on the evening of Dec. 15 by F. W. A. Vesper, president of Vesper Buick Auto Co., distributor, to the officials and salesmen of the retail firm.

The contest will be decided on points, each car in the Buick line carrying a certain number of points for sales made. First prize to be awarded the retail firm with the largest number of points will be a hammered silver loving cup known as the Vesper Buick cup. Each salesman of the winning company will receive a gold watch-fob or emblem which will be suitably inscribed. In addition to the grand prize, a prize will be awarded each month to the team making the best record for that month.

### PLAN ZEPPELIN DEVELOPMENT

AKRON, O., Dec. 24.—The new Zeppelin industry will be developed at the Goodyear Tire and Rubber Co. more quickly than was anticipated when the Zeppelin patents were purchased, according to statements made by officials of the company.

It is now predicted that the end of the new year will find at least 3,000 and possibly 5,000 men employed in this division of the Goodyear company. When the patents were purchased it was believed that the production of these machines would not get under way for several years.

### PLANT FOR CROSSLAND STEAMER

STERLING, Ill., Dec. 22.—The Crossland Rock Falls corporation, with a capital stock issue of \$3,000,000, has taken over the business and plant of the Rock Falls Manufacturing company with the idea of making Sterling center production point for the Crossland steam car. The steamer is expected to be introduced to the market late in the spring of 1924. Incorporators of the new concern are E. Galt Brookfield of the Rock Falls Mfg. Co.; Judge E. C. Sheldon of Sterling and B. Crossland Pfaff, designed of the car.

## New Laws Affect Dealers' License Fees in California

### Those Handling Trailers Must Have Additional License—All Sales Must Be Reported

SAN FRANCISCO, Dec. 24.—The automobile dealer in California is very strongly affected by the new Motor Vehicle Act. A marked change is shown in fees for 1924, and there are other changes from the old law which affect the manner in which a dealer must handle his business in this state. Dealers handling trailers, for example, must have special licenses. The fee for the three separate forms of licenses which dealers must have, per quarter, and without reduction, is as follows:

Automobile dealer, \$5 for the first set of plates, and \$3 for each additional.

Motorcycle dealer, \$5 for first plate, and \$1 for each additional.

Trailer dealer, \$5 for the first plate and \$1 for each additional.

Any dealer who neglects to renew his license by March 2 will pay double registration fee. In the past, dealers have been required to report the sales of all cars to the division of motor vehicles of the state government, and only occasionally did a dealer fail to do this. Under the new law, however, a dealer lays himself liable to revocation of his license, or refusal of renewal of that license, if he fails to report to the department every car sold.

The new law also requires that dealers' plates, as well as the 1924 individual plates, must be displayed on a 1924 registered car which is taken in trade.

The new law aims to give still greater protection to the legal owner of a car, who holds a certificate of ownership, which is delivered to him with the 1924 plates. In the case of a transfer of the car in question, the certificate of ownership must be sent to the department of motor vehicles, the endorsements showing the transfer being recorded only on the certificate of ownership. The fee of this transfer is \$1, but failure to make report of the transfer of ownership within 30 days of the transfer will result in this fee being increased to \$2. In case of change of legal ownership only, the certificate of ownership must be signed by both the contracting parties and sent to the state department of motor vehicles with the \$1 transfer fee. Thereupon a new certificate of ownership will be issued to the new legal owner.

The penalty on transfers applies to dealers' licenses as well as to individual licenses. Any change in the ownership of dealers' plates caused by a member withdrawing or a new member entering a firm, or any change whatsoever in the personnel of any company dealing in automotive vehicles, must be recorded with the state department of motor vehicles within 30 days from the date of transfer, in order to avoid a penalty equal to the transfer fee being imposed.

## Keener Competition Due in 1924, Says Hardy of Olds

**Costs of Production Will Be Reduced to Minimum, Declares President of General Motors Unit**

DETROIT, Dec. 24.—Present competition in the automotive industry will grow hotter and hotter as the year 1924 progresses, A. B. C. Hardy, president of Olds Motor Works, said to distributor service managers at a factory meeting last week. As a result of this, he said, the automobile buying public will receive greater dollar for dollar value than they have ever received before.

The entire condition will resolve itself into a question of economics, he declared. The company which can maintain production and eliminate every unnecessary cost, no matter how small, will be the one that will weather the storm. He cited the changes that have been made in the Olds factories to prepare for the competitive era, and said though this cost over \$2,000,000 it was necessary that manufacturing costs might be reduced.

B. C. Koether, director of the sales, service and advertising sections of the General Motors advisory board, related what General Motors has done and is doing to reduce the cost of producing automobiles. Through standardization the number of different small parts used in General Motors cars has been reduced during the past few years from 13,000 to 2,000. This means a saving of many dollars, he said, which has been passed on to purchasers.

The service convention was in session three days under the leadership of R. M. Hatfield, service manager.

## Fabric Body in Big Demand in France Following Show

PARIS, Dec. 7.—(By mail.)—Since the closing of the Paris Show orders for 300 custom bodies have been received by the C. T. Weyman Company, builders of the lightweight fabric leather body which was one of the outstanding features of the French exhibition. New shops are being erected and every effort is being made to increase the present production, which is 70 a month, in order to catch up with demand. Despite this the firm has about 100 chassis of various makes waiting to go into the body shops.

This type of body appears to have definitely secured public favor in France. Recently important improvements have been made in the use of rounded panels by which the angularity which was one of the objections to this construction has been entirely eliminated. Licenses for the Weymann construction have been granted to seven firms in England, to one in Italy and to one in France. A Weymann body has just been shipped to the Fisher Body Corporation of Detroit.

### N. A. D. A. ENTERTAINS

ST. LOUIS, Dec. 22.—Distributors at the recent meeting of the St. Louis Dis-

trict of N. A. D. A. entertained dealers from other cities working under them with luncheon and dinner parties at which mutual problems and plans were discussed.

Among the distributors to so entertain were the Weber Implement and Automobile Co., Hupmobile distributor; Weber Motor Car Co., Studebaker distributor; De Luxe Automobile Co., Oldsmobile distributor; Mound City Auto Co., Gardner distributor; Ward Motor Car Co., Maxwell and Chalmers distributor; Newell Motor Car Co., Paige-Jewett distributor; Hudson-Frampton Co., Hudson-Essex distributor; Vesper Buick, Buick distributor; Wilson Motor Car Co., Haynes and Dort distributor, and the Southwest Nash Co., Nash distributor.

## Solons Want Diplomatic Immunity for Their Cars

WASHINGTON, Dec. 22.—Automobiles owned and driven by members of Congress are to have the same immunity as those of diplomats under the provisions of a bill introduced in Congress this week by Congressman Thomas L. Blanton of Texas.

Of course, no Congressman ever pays a fine for violation of any of the automobile regulations of the District, but it is declared to be a nuisance for them to be stopped by patrolmen and have to explain their identity when hailed by the minion of the law.

Under diplomatic regulations the automobiles of ambassadors and consuls are immune from molestation for any cause whatsoever. The same courtesy, Congressman Blanton believes, should be shown solons.

### SPACE SOLD OUT

PHILADELPHIA, Dec. 22.—For the first time in a number of years, every available foot of space on the floor of the Commercial Museum, for the automobile show, was sold out immediately on the day of the drawing. The meeting was presided over by Louis C. Block, chairman of the show committee and president of the Philadelphia Automobile Trade Association, under whose auspices the show, to be held Jan. 12-19, will be given. Virtually every car dealer in the city was represented and the custom of allowing bidding for preferred space was abandoned. Forty-seven exhibitors drew for space, representing 62 makes of cars, of which number 15 represented two makes. Seven makes of cars not exhibited last year will be shown at this event. The Flint, Collins and Rollin are among them. There are 37 exhibitors of accessories.

### BOOSTERS MEET IN JANUARY

MINNEAPOLIS, Minn., Dec. 22.—Matt J. Herold, district manager of the Wood-Imes Mfg. Co., announces that the first meeting of the Ohio Valley Boosters' Club, will be called at Cincinnati in January. Headquarters of the club will be at Cincinnati and it will be affiliated with the parent Boosters' Club at Boston.

## 1923 Easily the Greatest in History of State of Oregon

**Sales Good Throughout Entire Year With No Serious Break at Any Time**

PORTLAND, Ore., Dec. 22.—The year just closing has been easily the greatest in the history of the automotive industry in Oregon, in so far as the sale of new cars is concerned. Sales have been good throughout the entire year without a serious break, and by Dec. 31 over one and one-half times as many new cars will have been sold as during the next best year, which was 1920, and over twice as many new cars will have been sold as during 1922.

These facts are shown in figures just made public by the motor vehicle department of the state, with offices at the state capital at Salem.

The registration on Dec. 31, 1922, was 134,566 automobiles. On Dec. 15 this year the registration is 167,135 cars, an increase of 32,569 cars. By the end of this year it is estimated the total number of cars registered will be close to 168,000 and the total increase for the year over 1922 will be over 33,000.

The next greatest year in increase of the number of automobiles operating in the state was in 1920, when registrations jumped from 83,332 to 103,790, an increase of 20,458. The year 1921 showed a decrease as compared to that, and during 1922 there was an increase of 15,951 cars.

## Milwaukee Parts Makers On Full Production Schedule

MILWAUKEE, Wis., Dec. 24.—While some shops engaged in the manufacture of units, parts and equipment closed down Saturday night until Jan. 2 for the holiday vacation and inventories, the majority of plants are reducing the ordinary vacation or holiday recess to the first two days of this week and next, because specifications on contracts and orders call for deliveries that require as full a production schedule as possible. The situation in this respect is not much different from a year ago, when the holiday recess in most works was limited to the two holidays. The extra day being granted this year is due to the feasible position of the holidays, as they fall on Tuesday.

On the whole, the activity of the automotive unit and parts industry at this time is comparable to that of a year ago. There is, however, absent, the rather feverish insistence of manufacturers that deliveries be speeded up to the last notch, as a year ago. Car and truck builders are adhering closely to delivery specifications without rushing factories. Deferment of deliveries and cancellations of any part of original orders is almost an unknown quantity, and the state of the industry is regarded as substantial and healthy, with prospects for the first three to six months of 1924 equally so.



## Football Sales Contest Staged by Denver Dodge Dealer

**Craig-Baker, Inc., Have Novel Sales-Teams With Miniature Field Showing Plays**

DENVER, Dec. 19.—A sales contest of exceptional zeal, with touchdowns, yardage gains and losses, off-side penalties and other football features, is being conducted by Craig-Baker, Incorporated, Dodge dealers for Denver and vicinity. Furthermore, besides stimulating a lot of keen rivalry, this stunt is adding substantially to the sale of new and used cars, trucks, bodies, service and other automotive merchandise sold by this lively firm, by whose vice president, James A. Baker, this "football contest" was originated.

The twenty-six salesmen are divided into two teams known as the "Dodgers" and the "Gray-Hams," while the remaining 30 members of the Craig-Baker organization are equally divided into rooting squads for the two teams. The game is played under regular football rules (play starting in the middle of the field, etc.), with this one exception: If the team on offense loses more than 20 yards in one day, the ball is given to the defensive team. Coaches and a head linesman are also appointed to add zest to the game, while each side has a bunch of yells and artists among players or rooters have a chance to display their special talents in making cartoons of the various players.

Each day constitutes one play, with the result determined by adding up the total score of the players on each side and using the difference as the net yardage gained by the successful team that day. The points allowed by yards are as follows for sales code:

Used cars, 15 yards.  
Kalamazoo bodies, 10.

Touring cars, 12.  
Business sedans, 10.  
Graham Brothers' trucks, 20.  
Panels, 15.  
"A" sedans, 10.  
Screens, 10.  
Coupes, 5.  
Roadsters, 5.  
Chassis, 10.  
Accessories, tires and oil,  
one yard for each \$5  
sale.

A goal kick is credited for a sale of \$25 worth of labor in one day (24 hours). The "off-side" penalties are: Five yards for being late or absent one day. Fifteen yards for no reports.

The distance gained by each team is visualized and the play worked out each day, a bulletin being written and posted each evening describing the day's play in detail. The offense is given four downs to gain ten yards, the same as in regulation football, and many types of plays are being worked out to show just what happens.

The score now stands at a tie, 14 to 14, and the game will be declared ended just before Christmas. Then the members of the winning team will be awarded \$200 in cash prizes, with a gold watch for the salesman gaining the greatest number of yards. The rooters on the side of the winning team will also be treated to a theater party. The best men are honored with the best positions on the team, while those with the lowest sales yardage are ranked as substitutes.

A miniature football field, with the two teams, rooters, officials and mascots, is kept on a wide ledge in the salesroom, where the relative position of the teams is shown during each day's play. Customers and other visitors ask all sorts of questions about the contest, all of which helps to build business and good will. The Broadway branch and the Boulder and Longmont dealers are included in the contest, thus making the interest all the more lively.

## Legislation Asking Repeal of Tax Brings Many Letters

**Dealers, Owners Swamp Ways and Means Committee With Requests for Reduction**

WASHINGTON, Dec. 22.—Legislation asking for the repeal of the excise taxes on automobiles, motorcycles, trucks, tires and accessories, introduced on December 10 by Congressman R. H. Clancy (Dem.) of Michigan has resulted in a deluge of proffered support of the measures.

Not only have members of the House Ways and Means Committee, to which the three measures were referred, received a volume of correspondence in regard to the measures, but an investigation shows that practically all Congressmen and Senators have heard from their constituents asking their support of the measure.

The letters are largely from automobile owners, declaring that they are of the belief that the emergency has passed where it is necessary for Congress to tax these essential commodities. A great many of the letters are in a sarcastic vein alluding to the government's classification of the tax as "a luxury tax."

A typical example of one from a West Virginia farmer to one of the members on the Committee is as follows:

"I've just bought my second flivver. I use it to haul garden truck, pigs, and other live stock during the week and we go to church in it on Sunday when the roads are not too muddy. I wish some of you aristocrats in Washington had to spend a week in my car and I'd jolt the idea out of you that the use of my automobile is a luxury, on which I paid a \$34 luxury tax. I hope you repeal the measure."

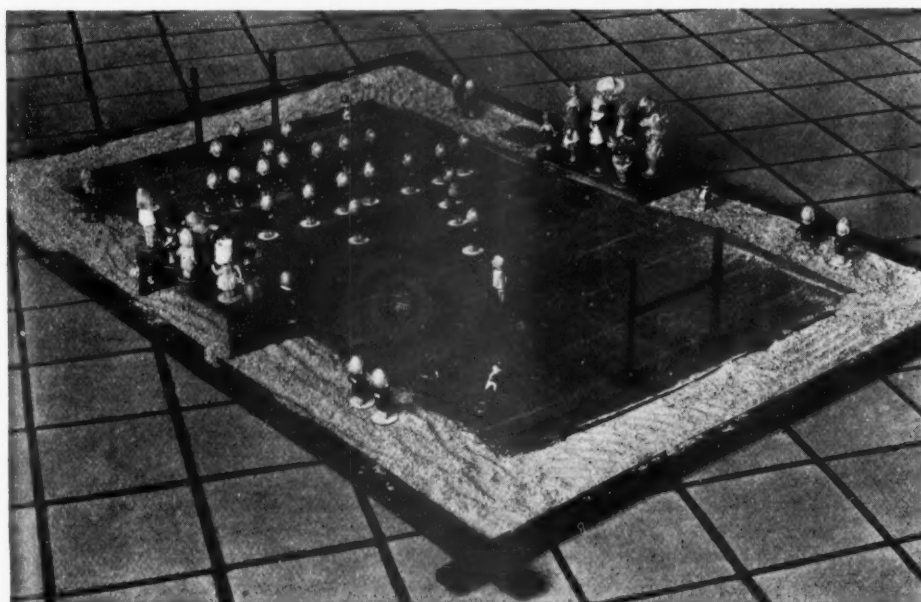
A great many of the protests against the further collection of the excise taxes are voiced by automobile manufacturers and accessory associations. One of these was from Alfred H. Swayne of the General Motors Corporation and representative on the National Industrial Conference Board and in the United States Chamber of Commerce.

In studying the question of repeal of the tax, Swayne has written the Committee, sight should not be lost of the fact that in addition to the Federal excise taxes, automobile owners are burdened with state taxes of a great many varieties, as well as county taxes.

### SOUTHERN SHOW FEB. 16-23

ATLANTA, Ga., Dec. 24.—The dates that have been selected for the Southern Automobile Show to be held at the Atlanta Auditorium under the direction of the Atlanta Automobile Association, are Feb. 16 to 23. Virgil Sheppard will again be general manager of the show. One of the features of the 1924 show will be a graphic illustration of the industry's progress the past 15 years, cars to be displayed of every year's model for as far back as it is possible to secure them.

## Cheer Leaders N'Everythin'



## Automobile Dollar To-day More Than in Pre-War Times

### Money Spent for Cars Gains in Value on Money Spent for Other Necessities

NEW YORK, Dec. 22.—Careful compilation of statistics has convinced the National Automobile Chamber of Commerce that the automobile dollar of today buys more than its pre-war brother. Investigation under the direction of General Manager Alfred Reeves has convinced him that the automobile dollar has gained several laps on the cost of living and that it now is worth \$1.11 as compared with 1913, whereas the cost of living has so increased that the dollar spent this way is worth only 61.3 against 100 cents before the war. The tire dollar is worth even more—\$1.23—while the gasoline dollar is valued at \$1.01.

Results of this survey have been sent to the members of the Chamber by General Manager Reeves in the shape of a chart and a statement which reads as follows:

"Based on the 1913 dollar as a standard, it is possible to get more automobile value for the money today than it was 10 years ago. When one takes the average prices of automobiles, gasoline, and tires, it is found that these automotive products cost less today than before the war, even though the purchasing power of the dollar in general has shrunk considerably. Today one can purchase 111 cents worth of automobile, 101 cents worth of gasoline and 123 cents worth of tires with his 1913 dollar.

"This fact, in the opinion of the National Automobile Chamber of Commerce, which has compiled figures from the records of various governmental and private statistical groups, is one important reason for the great activity in automobile buying.

"Better highways and the general need for motor transportation account for a large share of the increase in motor vehicle registration, but this has been further augmented, the industry feels, by the fact that the public realizes that a dollar will buy more in motor products than in most other lines.

"Furthermore, the current models of motor vehicles and the present type of tires are far better than 10 years ago, even at the lower prices prevailing today.

"The pre-war dollar is worth only 61 cents today in the general cost of living. It is worth but 51.8 cents in clothing, 68.5 cents in food and 61.2 cents in rent.

"The automobile industry has met the problem of higher labor and taxation expenditure by the economies of large scale production, reducing prices, in the confidence that the public would respond to exceptional value. The output of 4,000,000 vehicles this year, 50 per cent ahead of any preceding year, has justified that confidence.

"The following table shows the purchasing power of the 1913 dollar in vari-

ous commodities and gives the source of the data.

1913	Commodity	1923
100 cents	Automobiles	111 cents
100 cents	Gasoline	101 cents
100 cents	Tires	123 cents
*100 cents	Cost of Living	61.3 cents
100 cents	Clothing	51.6 cents
100 cents	Shoes	60 cents
100 cents	Food	68.5 cents
100 cents	Furniture	53.4 cents
100 cents	Rents	61.2 cents
100 cents	Frame Building	45 cents
100 cents	Brick Building	46.3 cents
100 cents	Concrete Factory Building	48.5 cents
100 cents	Farm Crops	73.5 cents
100 cents	Live Stock	98 cents
100 cents	Consumers Goods	64.5 cents

\*1914 used as base, as 1913 figures were not obtainable.

"Sources of data were: Automobiles, Cleveland Trust Co.; gasoline, Oil Trade Journal; tires, "Tires" (a trade publication); cost of living, National Industrial Conference Board; clothing, U. S. Bureau of Labor Statistics; shoes, Survey of Current Business; food, U. S. Bureau of Labor Statistics; furniture and house furnishings, U. S. Bureau of Labor Statistics; rents, U. S. Bureau of Labor Statistics; frame buildings, Survey of Current Business; brick buildings, Survey of Current Business; concrete factory building, Avertaw Construction Co.; farm crops, U. S. Department of Agriculture; live stock, U. S. Department of Agriculture; consumers goods, Federal Reserve Board."

### WANTS COMPULSORY INSURANCE

WASHINGTON, Dec. 22.—The passage of a state law compelling every automobile driver in the State of Maryland and approximately 50,000 from the District of Columbia, to carry insurance protecting those whom he might injure or whose property he might damage has been asked for by the Automobile Club of Maryland in a resolution sent to the state legislature.

This law, members say, is aimed at "financially irresponsible" drivers who injure innocent persons and are unable to give satisfactory compensation for the damage done. The club has announced its intention of pressing the legislation at the next session of the legislature.

## Tire Company to Pave Akron Street With Rubber

AKRON, O., Dec. 2.—Goodyear Tire and Rubber Co. has received permission from the city of Akron to pave a portion of East Market street on which the plant is located with rubber paving blocks as an experiment to test this type of paving material.

The proposed rubber paving will extend completely across the street and will be approximately 20 feet long. A hard surface and a soft surface rubber are to be tested at the same time.

## New York State Dealers Perfect Their Organization

### Twelve Local Associations Unite in Federation at Convention Attended by 150 Members

SYRACUSE, N. Y., Dec. 24.—Twelve city associations of automobile dealers have formed the Empire State Automobile Merchants' Association. They include New York, Brooklyn, Albany, Syracuse, Rochester, Schenectady, Binghamton, Poughkeepsie, Elmira, Utica, Oswego and Rome. Each city association is a member and dues are paid on the basis of \$10 a year per dealer member of the local association, under which plan, for instance, the New York association pays \$550 a year and some up-state organizations pay from \$100 up. The association will try to improve trade conditions and foster equitable legislation.

The association has been in existence on paper since last spring, but it was permanently organized last week at a convention attended by 150 dealers, including delegates from the 12 association members. The general manager is E. A. Moree, who has been loaned for part time work by the Automobile Merchants' Association of New York City, of which he is also general manager. Headquarters will be temporarily in the general manager's New York City office in the Fisk building.

### Will endorse used car plan

The association organized on a federation instead of individual member basis to avoid the experience of some state organizations whose managers have had to spend much of their time dunning individual members for dues. It was felt that while the new plan might sacrifice something in the way of democracy it would be easier to keep alive and action on important subjects could be obtained more promptly through approval of the boards of directors of member-associations than by submitting them to a large membership of individuals.

Possible activities for the association under consideration include endorsement of a used car plan—possibly the N. A. D. A. or Appleby plan—establishment of a central testing laboratory to pass on accessories and supplies, establishment of a central purchasing agency and co-operative arrangements with insurance companies.

The association elected the following officers: President, E. J. Ellis, Dodge Brothers, Rochester; vice-presidents, H. A. Rayne, Albany, and Reginald G. Smith, Dodge Brothers, Rome; treasurer, Joseph Haas, Ford and Lincoln, Brooklyn; secretary, L. D. Clute, Ford, Elmira. The officers and the following are directors: W. W. Garrabrandt, Franklin, Utica; C. W. Bull, Marmon and Hudson-Essex, Syracuse, the latter having been president of the association since its formation.



## Dealers to Hear Plans for Reducing Used Car Losses

### N. A. D. A. Three Day Session in Chicago Open to Dealers of the Country

CHICAGO, Dec. 22.—Co-operative steps undertaken by automobile dealers to reduce used car losses and "solve the used car problem" probably will furnish the most interesting session of the Seventh Annual Convention of the National Automobile Dealers' Association to be held at Hotel La Salle, Chicago, Jan. 28-31, 1924. This meeting is open to all dealers of the United States. Special reduced rates of fare and one-half have been granted by the railroads to members of the association.

Three plans that have attracted nationwide interest in the last year, will be discussed. The first of these plans, the "Appleby Motomart," will be discussed by James E. Appleby of Detroit. Appleby together with Percy Chamberlain has formed the Percy Chamberlain Associates, Inc., to nationalize the Appleby Plan.

By the Appleby plan the automobile dealer absolutely washes his hands of the used car as a part of his business. Instead all used car transactions are handled by a motomart, operated by the dealers without profit, where used cars are bought and sold, with a definite price for each used automobile dealt in. This plan was begun in Anaheim, California, last March, is in use in 26 Pacific Coast cities and by January it is expected that 50 or more cities in Michigan, Indiana, Illinois, Iowa and Pennsylvania will be operating these markets as a result of the promotional work of the Chamberlain organization.

The second plan to be discussed will be the Atlanta Statistical Bureau which has operated throughout the year. This is a bureau maintained by the dealers

of Atlanta for the appraisal and buying of used cars at a definite price in the Atlanta territory. R. H. Martin of Atlanta, President of the Martin-Nash Co., will discuss the accomplishment of the Atlanta plan.

The third plan to be presented will be the "Green Seal Merchandising Plan" developed by the dealers of Cleveland, Ohio, and which has been operating for about six months. R. J. Schmunk, Hudson-Essex distributor at Cleveland, will present this plan, which has as its characteristic feature the re-establishing of confidence in the used car as an article of merchandise, by standardizing its mechanical condition and guaranteeing that the car is in the condition represented when sold under the Green Seal certification of the dealer association.

The Appleby plan is the most radical departure in automobile merchandising that has developed since the introduction of time payment sales. The Appleby plan is based on the principle that the dealer cannot both buy and sell merchandise competitively and that inasmuch as he will always have to buy the used car competitively so long as old automobiles are traded in as part payment for new ones, then the dealers' only way out is to quit buying them at all.

The Atlanta plan is admittedly an effort to assist the dealer to buy cheaper and the Cleveland plan primarily a sales stimulant. The three plans will be presented at Chicago solely for the information of dealers who may be interested in knowing most recent developments in the trade and methods by which these developments have come about.

#### USED CARS AT AUCTION

BALTIMORE, Md., Dec. 22.—What some of the local automobile dealers regard as a step in the right direction in the solution of the used car problem was carried out here recently when about 10 of the dealers pooled some of their used cars and sold them at public auction. In all there were 65 cars offered.

## Car Owners in Texas to Part With \$14,000,000 for Taxes

### Horsepower and Weight Taxation Puts Cost of Licenses Up With Stars

DALLAS, Tex., Dec. 22.—The motor vehicle owners of Texas are going to have to cough up approximately \$14,000,000 in taxes this year. Fact is, they have coughed up the most of it and will have to get the remainder before the middle of January or suffer penalties. This amount is around three times what was paid in the shape of automobile taxes or licenses last year.

The new license law which recently became effective in Texas provides for taxing motor vehicles of all classes and in all sections of the state on both horsepower and weight. The license this year, to be paid before motor vehicles can be operated in 1924, ranges from \$12.50 on older styles of Fords to \$45 on the heavier cars like Packards. Heavy trucks with bigger horse power come still higher.

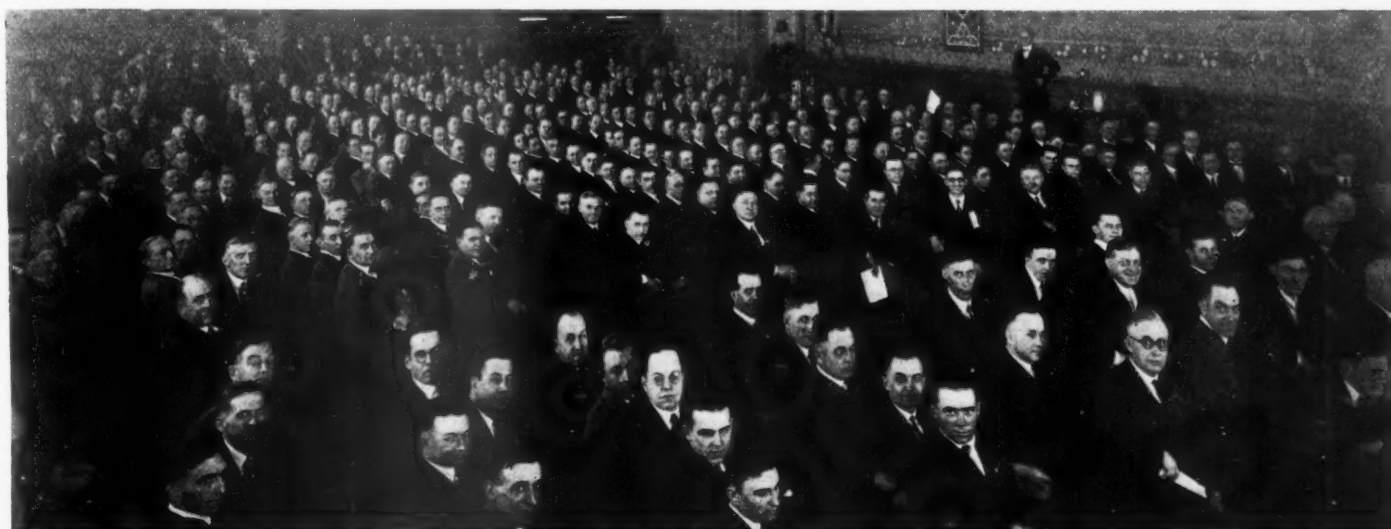
#### More than \$20 per vehicle

Automobile men and tax collectors have estimated the average tax per vehicle in Texas will be more than \$20. It is now estimated 700,000 motor vehicles will be registered in Texas.

Tax collectors in various Texas counties are now employing extra forces to take care of the rush to pay motor vehicle taxes. It is estimated more than \$8,500,000 already has been collected in motor vehicle taxes. The remainder will be gathered in shortly or the motor car owner must pay an additional 10 per cent for being tardy.

Despite the extra taxes the owner must pay, the automobile buying continues. December sales in Texas will probably be greater than those of November. Dealers declare the outlook for the coming year is bright.

## Dealers at N. A. D. A. District Convention at St. Louis



This photograph shows automobile dealers of Missouri and Illinois and surrounding states in attendance at the N. A. D. A. district convention Dec. 10 at Moolah Temple, St. Louis. This was one of eight sectional meetings held this year by the N. A. D. A.

## Urges Dealers to Strive for Five Per Cent Profit in '24

**C. E. Gambill at N. A. D. A. Says "Sell Complete Automotive Transportation"**

ST. LOUIS, Dec. 22.—C. E. Gambill, vice president of the National Automobile Dealers' Association, advises dealers to strive for a five per cent net profit in 1924.

A bulletin issued by the headquarters of N. A. D. A. quotes Gambill as follows:

"While it is unfortunately true that the great majority of dealers are not averaging a net profit of five per cent upon the gross volume of their business, still it can be done and it must be done if dealers are to continue in business.

"This cannot be effected if the dealer has in mind only the sale of new automobiles. But the dealer who is bending his efforts to become a complete automotive transportation merchant, serving the needs of all his present owners of new cars as well as attempting to sell to his as yet untouched market, will make that profit."

Gambill, who has been in the automobile business for 18 years, started originally as a district representative for the Marmon company at Indianapolis. He was Indianapolis branch manager for the Marmon company, then a factory executive and later became the Marmon dealer in Chicago. He is now president of the Gambill Motor Car Co., of Chicago, largest Hupmobile distributor in the United States. He is to discuss management on the program of the seventh annual convention of N. A. D. A. at the La Salle Hotel, Chicago, Jan. 28 to 31, which meeting is open to all dealers in the country. In addition to handling the Hupmobile he still handles the Marmon account for the Chicago territory. He has 78 sub-dealers and associates in his organization.

Headquarters of N. A. D. A. expects more than a thousand dealers to attend the Chicago convention. Railroads have announced a reduced rate of fare and half a round trip to members of the Association.

## Birmingham Closed Car Show Results in 60 Floor Sales

BIRMINGHAM, Ala., Dec. 22.—The closed car show in Birmingham Dec. 10, 11 and 12, resulted in 60 sales on the floor and provided all the exhibiting dealers with enough prospects to keep their salesmen busy for months. This was the third closed car show given by the Birmingham dealers and the most successful in volume of business.

Realizing that women are responsible for the purchase of most closed automobiles, especially in the higher price classes, Manager Julien J. Schwarz provided a fashion show as an incidental feature of the automobile show and thus brought about an unusually large attendance of women.

Through the cooperation of the department stores six models were used to wear and display the latest styles in coats, hats and other clothing especially suitable for motoring. The fashion displays were made on a stage, but after a model had posed a suitable time she would walk among the cars, stepping in and out of some.

Closed models of practically all the cars represented in Birmingham were exhibited.

## Millions for Motors but Nothing for Clothes

CHICAGO, Dec. 24.—The public today buys automobiles before clothing, is the complaint of the National Association of Retail Clothiers, which recently made a survey to determine what the farmers have done with the money received from their crops.

It was found that in one part of Texas where an unusually large cotton crop was harvested at the highest price in years 1000 new automobiles were sold, while suits and overcoats remained on the shelves. In one section of Iowa 850 veterans used their state bonuses to pay for automobiles and so far as could be learned not one of them bought a new suit.

A store in New York state which usually sells 150 suits and overcoats in the pre-Christmas season, disposed of only 17, while a store across the street sold 25 automobiles.

As a result clothing manufacturers in Chicago report large surplus stocks this year.

## NEW MANAGER FOR A. A. A.

WASHINGTON, Dec. 24.—Ernest N. Smith, chief of the campaign department of the United States Chamber of Commerce and former executive secretary of the Indianapolis Chamber of Commerce, has been appointed general manager of the American Automobile Association, a newly created position, according to an announcement made here by Thomas P. Henry of Detroit, president of the A. A. A. Smith will assume his new duties Jan. 1.

The appointment of Smith as general manager of the American Automobile Association marks the first step in a new program of development. The organization is to be enlarged, new departments created, additional services to motorists rendered, and an aggressive membership campaign started.

## APPLEBY AT ATLANTA

DETROIT, Dec. 22.—Twenty-four dealers of Atlanta, Ga., have signed an agreement with Percy Chamberlain Associates for the establishment of an Appleby Motomart in that city and will discontinue their used car departments at once. The list of dealers includes those handling practically every well-known make of cars. L. L. Halle, formerly manager of the Atlanta Statistical Bureau, will be in charge.

## Automobiles on Farms Are For Business, Not Pleasure

**Survey by Farm Management Bureau of U. S. D. A. Shows That 923 Farmers Own 1,008 Cars**

WASHINGTON, Dec. 22.—From two-thirds to nine-tenths of the use of an automobile on a farm is for business purposes rather than for pleasure.

A survey just completed by the farm management bureau of the U. S. Department of Agriculture reveals the fact on the 1,371 farms surveyed, 923 farmers owned 1,008 automobiles or trucks. The survey on which the figures are based was made in "representative" counties throughout the United States.

In the Atlantic Coast area, Chester County, Pa., was chosen. Fifty-eight per cent of the 423 farmers interviewed had machines. In the counties in Kansas, South Dakota, and Colorado, 70 to 85 per cent of the 383 farmers had automobiles or trucks. In Washington and Idaho, 86 per cent of the 250 farms reported ownership of cars. The only region where less than 50 per cent of the farmers owned automobiles was in the dry farming wheat area where 315 farmers reported only 152 machines.

The survey shows that the most popular type of car is the touring. Two-thirds of all cars were of this type. Of the whole 25 per cent were trucks. Roadsters, sedans and coupes were less than one-tenth of all machines used.

Some figures on the price and length of use of farm automobiles reveals the fact that: two-thirds, cost less than \$500 f. o. b. factory; the average purchase price of touring cars was \$689; the estimated length of life from 7 to 8 years; that of the other third that cost more than \$500, the prices ranged from \$850 to \$1250. Only eleven high priced cars were included in the entire survey.

Cost figures show that the average for a touring car on the farm, including depreciation, was between \$200 and \$300. Gas and oil made up about 50 per cent, with cost of tires, repairs and license fees making up the balance. Practically none of the cars were insured.

## Birmingham Dealers' Dues Increased to \$35 a Month

BIRMINGHAM, Ala., Dec. 22.—The Birmingham Motor Trade Association has increased the dues of its members from \$25 a year to \$35 a month in order to provide revenue to employ a full time secretary-manager and carry on the activities made necessary by the legislative situation in the state. Laws recently enacted by the Legislature were found to contain jokers which were very burdensome to the automobile industry and the trade association is endeavoring to have the authorities place a liberal construction on these laws. G. P. Caldwell is secretary-manager of the association.



## St. Louis Chamber Favors Municipal Garages; Subways

### Downtown Parking Problem Solution in \$8,240,000 Expenditure, Says Committee

ST. LOUIS, Dec. 22.—A special committee of the St. Louis Chamber of Commerce appointed to investigate and formulate plans for the relief of traffic congestion has recommended the building of six municipally owned garages each 200 feet square and six stories high at a total cost of \$8,240,000, and the building of subways as a solution of the downtown parking problem.

The plan as contained in the report contemplates the payment of 25 cents a day per car to provide revenue for the retirement of 40 year bonds with which the project would be financed, after which the city would own the buildings and land.

A survey has shown that an average of 22,000 vehicles enter the central business district daily, of which 12,000 are automobiles, and the committee estimates that cars requiring half day and all day storage in this district number 5500. Buildings such as recommended would provide space for 6000 automobiles, thus relieving the streets of this number.

The committee believes that congestion from parked automobiles causes delay to commerce at great financial loss. Subways for street cars are also recommended as necessary for the proper solution of the problem.

## Velie Has New Six on 118 Inch Wheelbase at \$1,095

MOLINE, Ill., Dec. 24.—A new six-cylinder car with 118 inch wheelbase and listing at \$1,095 for the touring model will be exhibited at the New York and Chicago automobile shows by the Velie Motors Corporation. The sedan model, also on 118 inch wheelbase, lists at \$1,545. In addition to these two models the company announces that there will be a line of de luxe models at somewhat higher prices, which will be equipped with four-wheel brakes and balloon tires.

These new models will use the Velie engine which was used in the 1923 Velie models, having a pressure lubricating system.

Baked enamel finish will be used on these new cars. The bodies are mounted low, semi-elliptic, underslung springs being used. Graceful appearance, perfect chassis balance and spacious room for the passengers are special characteristics claimed for the new models.

### NEW ENTERPRISES IN SOUTH

ATLANTA, Ga., Dec. 24.—November proved one of the greatest months in the development of the automotive industries of the South in years, according to information reaching Atlanta from a reliable source, to the effect that no less than 160 construction projects were an-

nounced by the industry during that month in the various southern states, including new buildings by dealers in the automobile, accessory or tire field, new garages and service stations, and new companies formed in these fields. The average for the first ten months of the year was 120 per month, but November reached a total of 160, one of the largest months in years, indicating the healthy condition of business in the South.

## November Decrease in New Work Is About 30 Per Cent

NEW YORK, Dec. 22.—November registrations of new cars in this city showed a decrease of approximately 30 per cent from October among all prices of cars, but the decrease was slightly greater among high priced cars, according to the Automobile Sales Analysis published by Sherlock & Arnold.

Total registrations for the 11 months of the year in the low and medium priced lines are 76,200, as against 62,301 in the same period in 1922 and 41,732 in the 11 months of 1921.

In the high priced line registrations for the first 11 months aggregated 7,888, as against 6,758 for that period last year, and 4,359 in 1921.

Registrations in excess of 10,000 are still limited to two cars in the low and medium priced line; three others are greater than 4,000; fourteen are more than 1,000; eight have more than 500 registrations and 19 have between 100 and 500.

Recapitulation by months for this year is as follows:

	Medium and Low Priced	High Priced
January .....	2,803	212
February .....	2,775	606
March .....	8,050	821
April .....	11,050	1,180
May .....	11,220	1,059
June .....	9,699	815
July .....	9,127	760
August .....	6,458	542
September .....	5,430	553
October .....	5,572	801
November .....	4,016	539
	76,200	7,888

### SCHWAB TO ADDRESS N. A. C. C.

NEW YORK, Dec. 24.—Charles M. Schwab, now a member of the automotive industry through his ownership of the Stutz Motor Car Co. of America, will be one of the speakers at the annual banquet of the National Automobile Chamber of Commerce, which will be held at the Commodore hotel Tuesday, Jan. 8. Dr. Edward Cattell, city statistician of Philadelphia and also connected with the Philadelphia Chamber of Commerce, will be the other speaker.

### BIG DEMAND FOR SPACE

CHICAGO, Dec. 22.—The demand for space at the annual road show of the American Road Builders' Association to be held in Chicago Jan. 14 to 18 is so great that the Wilson Building near the Coliseum has been obtained to accommodate the overflow. In addition to this building and the Coliseum the show also will occupy the Coliseum Annex and the Greer Building.

## 8,820 Miles of Federal Aid Highways Completed June 30

### Report of Thomas H. MacDonald Shows the Total Mileage is 26,526

WASHINGTON, Dec. 22.—A total of 8,820 miles of Federal-aid roads, of all types, were completed during the fiscal year ending June 30, 1923, according to annual report of Thomas H. MacDonald, Chief of the Bureau of Public Roads, just made public. The year's construction brings the total federal-aid highway projects completed up to 26,526 miles, the figures show.

Construction now in progress amounts to 14,722 miles which is 53 per cent completed, while projects totaling 6,917 miles, have been approved for immediate construction.

"The outstanding achievement of the year has been the work done in selecting the roads to constitute the Federal-aid highway system," the report sets forth. "This has been done in accordance with the provisions of the Federal Highway act which requires that a system of roads consisting of not more than 7 per cent of the total rural mileage in each State be designated and that all Federal aid be spent on such a system. The total mileage of rural roads in the U. S. is 2,859,575 miles which will limit the Federal-aid highway system to 200,170 miles."

## Automobile Collisions Due to Carelessness; Avoidable

WASHINGTON, Dec. 22.—A majority of all automobile collisions result from carelessness and inattention and are, therefore, avoidable, according to a ten day test just made by the Automobile Club of Maryland.

There were 84 collisions during that period and of this number 38 were from carelessness and 21 from inattention. The 21 accidents caused by "inattention" were caused by the driver doing one of the following things: turning around to search for something in the rear of the car while operating, lighting a cigar or cigarette while operating, adjusting, opening or closing a windshield while operating, turning around and conversing with those in the rear, leaning out of the side of the car to listen for rattles.

The statistics compiled by the club are: thirty-six careless operating, 21 inattention, 1 failing to give right of way, 2 no signal, 1 speeding, 2 confused operator, 1 dazzling lights, 1 brakes defective, 9 both operators at fault, 8 unknown—total, 84.

### CONTINUE PIERCE-ARROW TRUCKS

BUFFALO, Dec. 24.—The Pierce-Arrow Motor Car Co. is not going out of the truck business. This is an authoritative statement issued by President Myren E. Forbes, as a definite answer to reports to the effect that the Pierce-Arrow company was planning the discontinuance of truck production.

## Hupp Completes Building; to Increase Stock \$4,000,000

**Plant Extensions and Improvements Have Cost \$7,000,000 in Past Four Years**

DETROIT, Dec. 22.—With its building program now practically completed, Hupp Motor Car Corp. will increase its outstanding capital stock by approximately \$4,000,000, to provide working capital for future growth. By the retirement of all outstanding preferred stock the company will place itself on the basis of having common stock as its only outstanding issue. Plant extensions and improvements during the past four years have cost \$7,000,000 which was paid wholly out of earnings.

The company's financial position was never better nor has it ever been in better position to pursue an active manufacturing program, declares Vice President Von Schlegel. Of the original \$1,500,000 of preferred issued all but 4,052 shares have been retired from earnings, and these will be redeemable at 120 from the proceeds of common stock issue. Less than \$500,000 of the proceeds will be used in this way.

Holders of common stock of record will be entitled to subscribe to the issue of 342,678 shares at \$12.50 a share. Common stock outstanding will be increased 60 per cent. Apportionment to present holders will be at the rate of three-fifths of a share for each share held. Subscription warrants will be mailed to stockholders of record Dec. 24, specifying

amount they shall be entitled to subscribe.

In connection with the new stock, the company declares in a letter to stockholders that a quarterly cash dividend of two and one-half per cent has been declared payable Feb. 1 to stock of record Jan. 18, which will include the new issue. Business of the company during the current year will total more than \$40,000,000. There is no bonded indebtedness.

Of the expansions made in the past four years, the addition to the main manufacturing plant, Detroit, is the most important. This has given practically doubled space for final manufacturing operations. The body plant of the company at Racine has been brought to high production and with the addition of a plant now nearing completion in Detroit will give the company complete coverage for all body requirements in quantity.

## A. A. C. Convicts Tire Man Who Misrepresented Wares

NEW YORK, Dec. 22.—Announcement is made by the National Vigilance Committee of the Associated Advertising Clubs of the World of the conviction of Max Katz, treasurer of the Merchants Tire Co. of Boston, on a charge of representing factory seconds as "perfect in every respect." It was established at the trial that the tires sold as a result of this advertising were not up to quality.

Although Katz had been warned that his advertising was illegal, he ignored it, which resulted in placing the facts before the district attorney at Boston and Katz's conviction.

## Gardner in Strong Financial Position, Statement Shows

**Quick Assets Amount to More Than a Million Dollars; No Bonded Debt**

ST. LOUIS, Dec. 22.—The balance sheet of the Gardner Motor Co., Inc., shows the company to be in a very strong position financially and also shows rapid strides in the development of its sales organization. The quick assets of the company amount to more than \$1,000,000 with total tangible assets of about \$1,500,000. There is no bonded debt or preferred stock outstanding.

At the close of October the company showed a greater number of distributors and dealers in its organization than ever before, totaling about 1200, and it has spent considerable money for the strengthening of its sales force.

Despite the heavy expense incurred by expansion, net earnings for the nine months ending Sept. 30, amounted to \$128,484.66.

New contracts with distributors for 1924 have just been concluded and carry a total estimate from these distributors as to their requirements for next year of 17,545 cars.

Commenting on the audit, R. E. Gardner, Jr., president of the company, said: "In 1919 there were two Gardner models, a touring car and a roadster. Today there are nine distinct body types.

"The first Gardner standard touring sold for \$1195 and as high as \$1285. Today a vastly superior car is selling for \$995.

"In 1919 there were 20 distributors and 100 dealers in the Gardner organization. Today there are approximately 50 distributors and 1000 dealers.

"During the first year there were 200 men employed and 400 cars shipped. This year there were approximately 1000 men employed and there will be around 12,000 cars shipped."

## TEACHER WINS SAFETY PRIZE

WASHINGTON, Dec. 22.—Miss Teresa M. Lenney, a teacher in the New Rochelle, New York, public schools, contributed the best practical lesson on highway safety entered in the 1922 national contest, according to announcement today by the Highway Education Board. More than 60,000 elementary school teachers competed.

Five hundred dollars in cash and a trip to Washington with all expenses paid is the reward Miss Lenney will receive, her prizes the gifts of the National Automobile Chamber of Commerce.

## BAY STATE A. A. CHANGES NAME

BOSTON, Dec. 22.—The Board of Governors of the Bay State A. A., the oldest motor club in New England, voted to change the name of the organization to the Boston Motor Club providing the members agree to the plan. A referendum vote on the plan is being taken.

## Tire Executives Hold Important Conference



DAYTON, O., Dec. 22.—Branch managers and factory executives of the Dayton Rubber Mfg. Co. held an important conference here recently to make plans for 1924. The conference agreed that the tire dealer to be successful must have, first, a quality product; second, a margin of profit that will enable him to safely take care of his business; third, protected territory that will permit him to grow; fourth, co-operation from the manufacturer. The conference set its goal for 1924 at 25 per cent more business than was done in 1923. Those in the photograph are: Top row, left to right—H. T. Burchard, F. J. Redemann, E. F. Rigg, C. W. Hamilton, D. W. Warden, Ray Stelzig. Second row—C. F. Buttrick, J. A. Roper, P. C. Hunter, C. F. Faro. Third row—F. G. Miller, A. L. Freedlander, E. L. Horner, W. G. Hand, H. L. Boger. Bottom row—G. W. Spahr, J. A. MacMillan, J. S. Nall, A. J. Naylor, J. D. Hutchinson, H. B. Miller.



## Tickers May Be Used to Keep Dealers Informed on Prices

### Detroit Automobile Sales Managers Consider Devices for Used Car Prices

DETROIT, Dec. 22.—Ticker service recording prices and quotations on used cars is being seriously considered by the Detroit Automobile Sales Managers Association as a means of keeping every retail salesroom in the city in immediate touch with the used car market. The main purpose of the service would be to keep sales managers informed on appraisals in much the manner that quotations on stock prices are given.

Whether the ticker service or some form of it is actually put into operation, sales managers are determined through their association, to keep in immediate touch with the used car market. High appraisals brought about through companies competing against reported appraisals of others are to be ended if it is possible to end it. As an immediate result of the formation of the association, sales managers are in position to consult with one another on appraisals.

As a feature of the December meeting of the association, 26 members attending were requested to submit allowances that they would make today on six hypothetical touring cars of different makes in specified condition. The makes selected were Buick, Studebaker, Dodge, Overland, Chevrolet and Ford. The cars were of different years. Averages were then struck, the high and low prices shown and the forms returned to each member with these results attached to their own estimates.

Results of the questionnaire were as follows:

Make—	Average	High	Low
Buick .....	\$582	\$750	\$350
Studebaker .....	577	650	350
Dodge .....	423	575	300
Chevrolet .....	285	350	100
Overland .....	288	365	100
Ford .....	230	275	175

Reasons why there should be differentials in appraisal such as shown were then discussed. Each member was asked how he had figured on necessary reconditioning. Experiences were exchanged. High appraisals were shown mostly where the sale involved a high priced car purchase and low appraisals the reverse. In all cases it was agreed the resale would have to be at market price far below the average set up. By keeping the market price definitely in mind, it was agreed, members could do much to eliminate losses.

It was the opinion of the meeting that it was ridiculous to hold over used cars until spring in expectation of selling them at profit. The situation called for selling at once and taking whatever losses were necessary. Appearance of radically changed models on the spring market and the almost certain downward revision in prices by manufacturers would only entail greater loss. Liquidation at once was the safest course, it was agreed.

The necessity of confidence in each others' appraisals were emphasized by speakers. By checking up among themselves on reasons why sales were lost, presumably through higher appraisals, it could be determined who was right and who was wrong, and whether the salesman was at fault. Only by constant checking up in this way could results be gained, it was declared, appraisal sheets written for periods of months being worthless in the rapidly changing market.

## New Firm to Make Balanced Pressure Steering Gears

DAYTON, O., Dec. 22.—C.P.C. balanced pressure Ford replacement steering gears are now being made by H. G. Diefendorf, who has purchased the steering gear division of the Recording Devices Co., of this city. Manufacture of this device is being continued temporarily in the plant of the Recording Devices Co., pending negotiations for the manufacture on a large scale of this and the larger models.

This steering gear is being made under patents of J. P. Lavigne of Detroit. The Model D-1, suitable for cars weighing 3000 pounds, is used on many racing cars, while Model D-2 is designed for the heavier type of passenger cars and medium trucks. Model B, the first type developed, is used on heavier vehicles.

Immediate production of the Ford model and Model D-1 is planned, but Models D-2 and B for larger cars and trucks will not be pushed at present.

## Used Cars Shipped to Japan Earthquake Area

HONOLULU, T. H., Dec. 1 (By Mail).—Used cars by the hundreds are being shipped from the United States to Japan for use in the devastated areas of Tokyo and Yokohama. The steamship Kendal Castle which arrived here early in December from New York via Panama Canal carried 300 automobiles, principally Fords, consigned to Japan. Every boat passing through here from United States ports since the earthquake has had on board ten to two hundred used automobiles for Tokyo and Yokohama. More than two hundred used cars have been shipped by Honolulu dealers to Japan during the last few weeks.

It is explained that the unusually large demand for these cars is due to the fact that practically all of the automobiles in the earthquake zone were destroyed and that with the clearing of the streets of debris the necessity for a means of rapid transportation is made manifest. Since the earthquake there is a big shortage of rickshaw men in the two cities and many of the used cars now being received are for jitney service.

## Fifty Per Cent Loss in Sales in Indiana and Illinois

### November Shows That Half the Number of Sales Made in October Were Registered

CHICAGO, Dec. 22.—Approximately a 50 per cent loss in passenger car sales in both Illinois and Indiana was registered during November as compared with October, the showing in Illinois being slightly the better. The reduction from the spring peak was 72 and 73 per cent, respectively. The decline in Ford sales from the preceding month was greater than in any other class in Indiana, the loss being 56 per cent, while in Illinois the slump of 49 per cent was 19 per cent greater than the loss in medium priced cars. For the 11 months Ford sales were 42 per cent of the total in Illinois and 56 per cent in Indiana.

The following table indicates the losses in November as compared with October and also with the high month of the year:

ILLINOIS			
Class	Decrease from Oct.	High Mo. Decrease from	
Fords .....	49%	65%	
Low excl. Fords.....	50%	78%	
Medium .....	30%	75%	
High priced.....	39%	66%	

INDIANA			
Class	Decrease from Oct.	High Mo. Decrease from	
Fords .....	56%	72%	
Low excl. Fords.....	55%	79%	
Medium .....	47%	78%	
High priced.....	39%	80%	

The monthly average of sales in Illinois dropped to 14,451 and in Indiana to 9,676. Following is a table which gives the detailed figures:

ILLINOIS						
Low excluding Medium High						
Month	Fords	Fords	priced	priced	Total	
Jan. ....	4,574	1,380	4,053	1,013	11,020	
Feb. ....	4,183	1,031	3,093	698	9,005	
March ....	5,444	2,190	4,317	685	12,636	
April ....	7,994	4,101	7,225	930	20,250	
May ....	8,199	4,618	7,879	973	21,669	
June ....	6,735	4,597	6,262	780	18,374	
July ....	8,332	4,105	6,732	839	20,008	
Aug. ....	8,428	3,348	4,694	714	17,184	
Sept. ....	5,228	1,623	4,281	531	11,663	
Oct. ....	5,729	1,971	2,970	568	11,238	
Nov. ....	2,894	970	1,797	342	6,003	
Total ....	67,740	29,934	53,303	8,073	159,050	

INDIANA						
Low excluding Medium High						
Month	Fords	Fords	priced	priced	Total	
Jan. ....	3,871	697	1,138	164	5,870	
Feb. ....	4,206	818	1,131	206	6,361	
March ....	7,426	2,451	3,375	342	13,594	
April ....	6,445	2,917	3,950	498	13,810	
May ....	5,610	2,888	3,893	343	12,734	
June ....	5,120	2,858	3,561	249	11,788	
July ....	4,762	2,349	2,530	258	9,899	
Aug. ....	6,733	2,103	2,395	199	11,430	
Sept. ....	5,404	1,812	2,094	174	9,484	
Oct. ....	4,719	1,315	1,654	163	7,851	
Nov. ....	2,076	586	851	98	3,611	
Total ....	56,372	20,794	26,572	2,694	106,432	

These statistics were compiled from data furnished to MOTOR AGE by Robinson's Advertising Service, Springfield, Ill., and Indianapolis Auto Trade Association, Indianapolis, Ind.

## CONCERNING MEN YOU KNOW

Arthur C. Nagel, assistant manager of the Ford Motor Co.'s plant at Buffalo, N. Y., has been promoted to the management of the company's business in Belgium, Switzerland, Holland and occupied Germany. His headquarters will be Antwerp. He sailed on Dec. 15 to take over his work.

R. L. Marshall has been appointed manager of the Dallas, Tex., branch of the Dunlop Tire & Rubber Co., of Buffalo, N. Y. The announcement was made recently by E. H. Kidder, general sales manager for Dunlop. Marshall will be in charge of sales in Texas, Oklahoma, Arkansas and part of Louisiana.

Don F. Kennedy, president and general manager of the Sterling Manufacturing Co. was elected president of the Detroit Tool Manufacturers' Association at its first meeting, held at the Detroit Athletic Club, Dec. 11. The association started out with a membership of some 30 of the larger tool manufacturers of Detroit, most of whom are engaged in the manufacture of tools, dies, jigs and fixtures for the automotive industry. The following other officers were elected: vice-president, E. F. Kramer; secretary, N. A. Woodworth and treasurer, O. H. Siewek.

J. P. Reis, president and general manager of the Eagle Motor Truck Co., was elected chairman of the Commercial Car Bureau of the St. Louis Automobile Dealers' Association, at a recent meeting to succeed C. E. Lightfoot of the Diamond T Company, resigned. Lightfoot has arranged to join his family in California. He has been in the truck and passenger car business in St. Louis for many years.

Ernest Sanger has resigned as sales manager of the Michigan Lubricator Co. to open his own sales office from which he will handle several accounts for manufacturers selling to the automotive field.

Ernest A. Bennett has been appointed manager of the new Oldsmobile branch in Memphis. For a number of years he was distributor for Dort in Indianapolis. Formal opening of the Olds Memphis branch will be on Dec. 10.

G. B. McCann has been appointed personal assistant to C. F. Kettering, president of the General Motors Research Corporation. McCann formerly was treasurer of the Dayton Engineering Laboratories Co., having been with that company since its organization.

Bedford W. Boyes, manager of the Louisville branch of the General Motors Truck Co., has been transferred to Oakland, Calif., and will be succeeded at Louisville by Phillip A. Kelleher, who has been with the General Motors Truck Co., at Pontiac, Mich., ever since he was discharged from the Army in 1919. For the last year Kelleher has been sales promotion manager at the factory.

E. E. Clayton, with the Union Motor Co. of Houston, Tex., for the past five years, has been made sales manager for that company. He has charge of both the new and used car departments.

C. C. Cotterell, manager of the Good Roads Bureau of the California State Automobile Association, and nationally known as an authority on good roads, has resigned to become chief engineer of the Western Willite Co., one of the largest paving firms in the West. The change becomes effective Jan. 1, 1924.

Harrison H. Boyce, inventor of the Motometer, has resigned from the general managership of the Moto-Meter Co., Inc., of Long Island City, N. Y., and hereafter will devote his energy to pro-

motion of another one of his inventions, Boyce-ite, a special motor fuel. E. V. Hennecke has been promoted from sales manager to succeed Boyce as general manager of the Moto-Meter Company. The president of the company is George H. Townsend. Boyce retains his financial interest in the company.

Dudley M. Hewette of the Big Four Auto Co. has been elected president of the St. Louis Chevrolet Dealers' Association. The other officers are Fred Grinham, vice-president; Phillip P. Fox, secretary-treasurer and Leland T. Gillman, Phillip H. Wells and J. P. McCarthy, directors.

Hal T. Boulden, who for nearly nine years has been connected with the Selden Truck Corp., of Rochester, N. Y., first as sales manager but for the past five years as vice-president in charge of sales, service and advertising, will, it is reported, sever his connections with that company. Mr. Boulden was one of the founders of the National Association of Motor Sales Managers which later merged with the Motor Truck Manufacturers' Association, the outgrowth of which was the present Motor Truck Industries. He also is given credit for the equitable dealer's perpetual agency contract, which has been well standardized among manufacturers. As yet no announcement has been made as to his future plans.

F. C. White, assistant sales manager in Buffalo, N. Y., of the Chevrolet Motor Co., has been appointed by Claude H. Paxton, manager of the Minneapolis branch of the Willys-Overland, wholesale manager for the branch, 1664 Hennepin avenue, to succeed F. A. Thomas.

William La Casse, well remembered because of the many records he established in the early days of the industry, when speed and the mastery of difficult roads were considered necessary to establish the worth of a car, died in a sanitarium in the central part of California, where he had been confined for some time, late in November. For years, he was district manager for the old Maxwell company in California, Oregon and Washington, and later joined the factory organization, traveling in eastern territory, but was compelled to return to California because of illness. Much of the present prosperity and extent of the automobile merchandising industry is due to La Casse, who in the early days of the industry did a great deal to instill a desire for automobiles in the mind of the public.

The White Company has purchased the entire half block bounded by Market, Mission and Eleventh and Twelfth streets, San Francisco, and will erect a modern sales and service establishment for White trucks there immediately, according to G. A. Urquhart, vice-president of the White Company, with headquarters in San Francisco. The new building plans, he said, call for a building costing between \$800,000 and \$1,000,000.

Herbert E. Woodward has been appointed manager of the northern California interests of the Reo Motor Car Company of California, and Wilmer Wood has been appointed assistant manager of the same interests in San Francisco, according to announcement by Byron C. Foy, president of the corporation. Both men are widely known in California automotive circles. Woodward having served for the past two and one-half years as assistant manager of the company at Los Angeles, and Wood having been wholesale manager in southern California territory for some time.

the ground that it held a title retaining note. The Logan City Court decided in favor of the garage company. The District Court reversed the decision. The garage then appealed to the Supreme Court which upheld the judgment of the District Court, giving possession of the car to the Cache company.

### CHEVROLET MOVIE MUSIC

ST. LOUIS, Dec. 22.—The band of the employees of the Chevrolet factory, St. Louis, has been billed to appear at a leading motion picture house of the city. Organized by E. W. Fuhr, zone manager of the St. Louis branch, the band has been the object of much favorable comment.

## Will Seek Organization of Parts Distributors at Shows

### To Develop the Merchandising of Standard Parts, Nationally, Is Aim

DETROIT, Dec. 22.—Formation of unit parts distributors into an organization to develop merchandising of standard parts nationally will be sought during the period of the national shows. The movement is understood to have the backing of several leading manufacturers in the specialized unit field, and several informal meetings have already been held at which the possibilities of such an organization have been discussed.

Distributors of parts for one manufacturer have already pledged varying sums of money to pay for preliminary organization work and this money has been augmented by subscriptions from several manufacturers. In the opinion of the manufacturers and of the distributors, the sale of standard parts for these units could be greatly developed by the independent distributors working along definite policies.

As planned the organization would include distributors affiliated with all manufacturers and would not be limited to the distributors of any one group of unit makers. Plans would be made to sell standard parts along definitely fixed lines, and would have the effect of counteracting the sale of parts by others than the original makers of the unit. Fundamentally the plan is to make certain that service will be available for all units in every section of the country, not only as an auxiliary to dealer service, but through the hands of a group actively engaged in selling service and nothing else.

## More Than 700,000 Tourists Visited Minnesota in 1923

MINNEAPOLIS, Dec. 22.—More than 700,000 automobile tourists visited the state and nearly \$40,000,000 was spent by them in Minnesota in 1923. This is the report of Secretary H. C. Hotelling of the Ten Thousand Lakes Association of Minnesota at the annual meeting Dec. 13-14 in Minneapolis. The basis of the figures is the report by the highway commission of cars entering the state and the usual needs of the average tourist. Sixty-nine per cent of state resorts had to turn away travelers for lack of accommodations.

In the 1923 season the Minneapolis Minnehaha tourist camp took care of 3,638 automobiles carrying 13,095 persons. This was a gain of 100 per cent over 1922. Iowa was best represented and August was the banner month. On Sept. 4 there were 215 cars in an enclosure made for 110 cars.

Figuring 3.06 persons to a car St. Paul's Cherokee Heights camp entertained 11,382 automobile tourists in 1923. The total was 3,723 cars. The camp capacity is 80 cars.

## Title Retaining Note Before Repair Bill, Utah Court Says

SALT LAKE CITY, Utah, Dec. 22.—A title retaining note precedes a repair bill for possession of an automobile, according to a decision just handed down by the Utah State Supreme Court. The case arose when the Cache Auto Co. of Logan sold a car to a man named Carlisle for \$300, payable at a later date, retaining title for security. The purchaser took the car to the Central Garage Co. for repairs, running up a bill of \$99.14. When Carlisle could not pay the bill the garage company held the car, claiming a lien to secure the account for repairs. The vendor company instituted proceedings for recovery of the car on



## BUSINESS NOTES

The Universal Bumper Co. is a newly incorporated Minneapolis company with \$50,000 capital. P. C. Engle is president, H. B. Foster vice-president and P. H. Purcell secretary and treasurer.

The Traveler Rubber Co., Bethlehem, Pa., in involuntary bankruptcy proceedings, has had George R. Booth appointed receiver by the court, with a bond of \$100,000.

President B. F. Everitt of the Rickenbacker Motor Co. is authority for the statement that Rickenbacker stock has been oversubscribed by several hundred thousand dollars and sale of same has therefore been discontinued. Some time since the company decided to withdraw from the market \$1,000,000 of its authorized issue and retain the stock in the treasury.

### Cadillac Official Reports 1924 Outlook as Favorable

DETROIT, Dec. 22.—Following a trip through the middle western states Lynn McNaughton, vice president and sales manager of Cadillac Motor Car Co., reports conditions favorable for continued substantial business. Before the end of the year much of the money now tied up in this year's crop will be released, he said and rate of purchases will increase and will probably be on a higher level during 1924.

Citing Minnesota, McNaughton said a detailed study of the agricultural situation for 1923 shows marked improvement over 1922, even though wheat, because of large production, is low. The farm value of all crops in that state, he said, for the year is \$154,000,000 more than in 1922. That is an increase of 89 per cent which is significant in that 47 per cent of the purchasing power of the State is dependent on agriculture.

Minnesota's manufacturers are operating at capacity, he said, and 21 per cent of the purchasing power of the state depends upon its industries. Bank clearings show an increase of 5 per cent over 1922. Purchases show an increase of 10 per cent over last year in Minneapolis and 8 per cent for the whole state. There are spots where conditions are unfavorable but the figures for the whole state reflect prosperity. What is true of Minnesota, McNaughton said, is probably also true of many other agricultural states.

### REO CONVENTION

SAN FRANCISCO, Dec. 22.—Representatives of the Reo Motor Car Co. of California, to the number of more than 100, representing every county in the state, held a three-day convention here last week, one of the largest and most important trade conferences in the coast automotive industry this year. Policies and merchandising plans for the coming year were discussed by Byron C. Foy, president of the Reo Motor Car Co. of California; W. E. Woodward, vice-president; T. E. McKnight, secretary-treasurer; Wilmer Wood, wholesale manager; Art Hammond, Stockton branch manager; T. F. Skelley, Phoenix, Ariz., branch manager; J. G. Vaughan, Sacramento branch manager; Dan Ferguson, Los Angeles branch sales manager;

Ralph Harwood, Hollywood branch manager, and a number of others.

All the speakers expressed confidence in the trade outlook for the coming year, and forecast a very healthy twelve months, not only for the Reo, but for all branches of the industry. The Reo Company has been expanding widely during the past year on the coast, having established branches in San Francisco, Oakland, Los Angeles, Stockton, Sacramento, Hollywood, in California, and in Phoenix, Arizona. Plans of the company to move the Sacramento branch into a new and specially-constructed building were discussed at the meeting, which was held in the showrooms of the Reo Motor Car Company of California, in San Francisco.

### PAY \$40,000; GET NO GAS

ST. PAUL, Dec. 22.—Through inaccuracy of 36 per cent of the gasoline pumps in the state, or 7,200 in 20,000, motorists in Minnesota in 1923 paid \$40,000 for gasoline they never got. This is the report at the convention of the Minnesota Association of Inspectors of Scales and Measures. Educational measures are planned and a series of penalties is recommended for improper methods of dealing out commodities. About 90 per cent of dealers under supervision in the state are honest, it is found. The motorists lost through secret valves in the hose from filling tanks, or vacuum left in the hose that siphoned back part of the gas from the car tanks. Occasionally deliberate tampering with filling tank measures has been discovered.

### WILLYS-OVERLAND INVENTORY

TOLEDO, Dec. 22.—The Willys-Overland Co., which has been running on an especially large schedule for this month, will shut down Tuesday for inventory. Due to the pressure of sales it has been announced that the plant will get under way again before Jan. 1.

The company will run considerably more than 200,000 cars produced this year for a new high record.

Schedules for the new year call for 1,250 cars a day within a few weeks after the first of the year and it is believed that 1924 will see considerably larger production than the year just closing.

### MORE GLASS FOR CARS

TOLEDO, Dec. 22.—Construction of the grinding and polishing unit of what will eventually be a \$15,000,000 plate glass plant will be started here in a few weeks by the Libbey-Owens Sheet Glass Co. This first unit is to cost about \$2,500,000 and will have a capacity of 8,000,000 square feet of plate glass a year. The entire output will go into the automobile trade to help fill the demand for glass for closed car bodies.

### NEW CINCINNATI OFFICERS

CINCINNATI, Dec. 22.—The Cincinnati Automotive Trades Association has elected officers as follows: President, Rolph R. Curl; vice president, Harry J. Franz; treasurer, Charles A. Fisher; secretary, Fred T. Gage; directors, Louis Hughes, A. F. Thieman, H. W. Sohngan.

## Vane Speaks on Future of Industry at Chicago Meeting

### Reviews 1923 and Shows That Dealers Have Made Progress and Bigger Profit

CHICAGO, Dec. 19.—The speaker at the luncheon meeting of the Chicago Automobile Trade Association this week was C. A. Vane, general manager of the National Automobile Dealers' Association, who spoke on the future of the automobile industry. The meeting was one of the most largely attended of the association's recent series of meetings.

Vane reviewed the industry in 1923 and showed that as compared with 1922 the dealers have made progress toward realizing a reasonable profit out of their business. He said that on the whole dealers and salesmen learned a good deal about how to reduce the allowance on used cars—the one thing necessary to a satisfactory adjustment of the trading feature of the business.

He declared the automobile owners of the country as buyers of new cars have combined against the dealers to keep up the prices of the cars they want to trade in and that in too many instances salesmen have taken the attitude of looking out for the interest of the customer in this matter rather than the interest of their employers.

After having traveled 50,000 miles in all parts of the United States in the last eight months Vane has concluded that there will be ready sale for a large number of automobiles next year. He believes farmers will buy more liberally than in any of the last few years. He told the dealers that the maintenance end of their business is rapidly assuming prime importance and that the successful dealer will be the one who sees in every car sale a future business from which the profit should equal or exceed that on the car sale.

### WEIDELY TO BE SOLD

INDIANAPOLIS, Dec. 22.—A court order has been issued for the sale at auction Jan. 15 of the assets of the Weidely Motors Co., now in the hands of a receiver. The receiver was appointed last August in a friendly proceeding brought to conserve the assets of the company. At that time a number of companies which had been purchasing engines from the company had suspended acceptances of engines on contracts pending improvement in their own condition. A plan of reorganization is said to have been worked out by officers of the company and a committee representing the present owners is expected to bid in the property.

### APPLEBY OFFICE IN ST. LOUIS

ST. LOUIS, Dec. 22.—The organization for the promotion of the Appleby plan has opened an office in St. Louis under the management of G. H. Ford, 1634 Arcade Building.

## IN THE RETAIL FIELD

E. G. Adams, Jr., of Washington, D. C. has been added to the list of Oakland dealers, in that city opening up show rooms and service station on Dec. 15, located at 1612 Fourteenth street, northwest. The firm will be known as the Adams Motor Co.

The Pierpoint Motor Co., 215-217 North Broad street, Philadelphia, distributor of Auburn cars, has secured the franchise for the Rollin car.

Lee W. Tremblay, formerly of the Philadelphia Tractor & Implement Co., Seventeenth and Vine streets, Philadelphia, has become associated with J. R. Pierpoint in handling the Rollin car at 215-217 North Broad street, Philadelphia. The Philadelphia Tractor and Implement Co. handles Cleveland tractors and Mid-West utilitons.

The Stallings-Ripple Chevrolet Co., 34 First street, Brooklyn, Baltimore, has been incorporated with \$50,000 capital stock. The incorporators are Elias G. Stallings, Sidney A. Ripple and Amos E. Ripple.

Franklin Motor Car Co., St. Louis Franklin distributor, has leased a new building at 2224 Locust street which contains 24,000 feet of floor space. The Franklin company was forced to find a larger place on account of the increase in their sales and service.

Earl R. Poston, has been appointed manager of the truck and tractor department of the Johnson Automobile Co., Ford dealer in St. Louis. Poston was formerly with the Traffic Motor Truck Co.

J. F. Hafner and L. P. Klemmer, operating under the firm name of Hafner & Klemmer, have been appointed Peerless dealers for Sacramento, Cal., and vicinity. They have opened sales and service at 1216 K street.

F. E. Lauppe, until recently Nash dealer in Sacramento, Calif., is opening an automobile financing and insurance business at that place.

The Northern State Steam Car Co., 119 N. Third street, Minneapolis, will distribute the McDonald Steam Car Co. automobile in Minneapolis and the Dakotas. N. P. B. Ekbergh is manager.

Bohn E. Fawkes Co. Hennepin avenue and Harmon place, Minneapolis, will distribute the Rollin car in the city and Northwest. L. L. Farish of the N. W. Duesenberg Co., Minneapolis, will introduce both the Duesenberg and Rollin car in St. Paul under the name of L. L. Farish Motor Co., Sixth, Seventh and Franklin streets. W. F. Frei, formerly Gehan Motor Sales Co., is manager for the city and county.

The General Truck Co., distributing the Republic truck in the Northwest, has moved to 85 Western avenue, Minneapolis, to get larger quarters.

T. P. Grogan of the Grogan garage, Stillwater and Red Wing, Minn., will handle the Star and Durant cars in the two cities.

The G. M. C. Truck Co. has leased the building at 238 West Fifth street, St. Paul, for its direct factory service branch. The Twin City branches are under management of John Nicol, with F. S. Pool as general sales manager.

Charles J. Dempsey, Inc., Ford and Lincoln dealer at 2300 West Madison street, Chicago, opened a new service building Dec. 17. The opening was preceded by a public reception in the building on Wednesday, Thursday and Friday of the preceding week. A feature of the reception was a display of the entire line of latest models of Ford and Lincoln cars.

The Scheadel Motor Sales, used car dealers, have taken over the quarters formerly occupied by the Gray representative in Chicago at 2218 Michigan avenue. Edward Scheadel, owner of the Scheadel Motor Sales is secretary of the Chicago Used Car Dealers' Association.

A. F. Chalmers, St. Paul, has been made manager for the new outlying Summit Chevrolet Co., Grand avenue and Victoria street.

The D. S. McVay Motor Co. of Trenton, Mo., is moving into its new garage building, which is one of the finest in Northwest Missouri.

The Auto Motor Car Service Co. of Popular Bluff, Mo., has secured the agency for the Gardner Car in that city. L. S. Shively and Leo Wagner are the members of the firm.

L. L. Murray and T. S. Boyd of Springfield, Mo., has formed the Murray-Boyd Motor and Tire Company and will distribute the Hupmobile line of motor cars and a complete line of tires. The new distributing agency will be located at 810 Boonville avenue, where the Hupmobile service station has been established.

The garage of J. D. Eagle of Bartlesville, Okla., together with another two story building, a rooming house and 15 automobiles were recently destroyed by fire with a loss of \$50,000. Engle, owner of the garage and cashier of the Oklahoma State Bank, had a narrow escape from

death when the tank on one of his automobiles, which he was endeavoring to shove out of the garage, exploded, covering him with burning gasoline. His burns were so severe that he was taken to the Bartlesville Memorial Hospital for treatment.

C. G. Brummitt of Trenton, Mo., has taken over the agency for the Dodge cars in that city and has opened a new garage.

H. W. Chatterton, formerly of Milford, Conn., has purchased the Paige-Jewett Motor Co., 301 West Grand avenue, Ponca City, Okla. For the last three years he was agent for the Studebaker cars at Milford. He will personally supervise the service department of the Ponca City Company. J. H. McIntire will remain as general sales manager.

Jesse H. Lyon, Jr. has purchased the S. L. Roberts garage at Centralia, Mo. He will handle the Chevrolet cars, Goodyear and Goodrich tires and Philadelphia batteries.

Work has been started on the new brick and stone building at 1249 Boonville street, Springfield, Mo., which will be occupied by the National Auto Supply Co.

O. B. Steinfeld, formerly used car sales manager for the Oakland Motor Car Co. at 1521 McGee traffic way in Kansas City, Mo., has taken charge of the used car department of the R & V Motor Co. at 1910 McGee traffic way.

The Floto-Peck Motor Co. of Mt. Washington, Mo., has disposed of its business to Clarence P. Brown and W. J. McKenzie of Kansas City, Mo. They will continue as authorized Ford sales agents.

The Flint-Belden Motor Co. of Bethany, Mo., will occupy a new location in the Edison building by the first of February. The building is being remodeled to suit the new tenants, who are authorized Ford agents. They will occupy the place now held by the Edison Motor Company, which is selling out everything but Ford parts, which will be taken over by the Flint-Belden Co. C. H. Edison says he will retain the Star and Durant agency but further than that has no plans for the future.

The Frank Casteel garage at Forrest City, Mo., which was occupied by Quinn Quick, was destroyed by fire recently when a barrel of denatured alcohol exploded.

Alfred Cutler Morse, who has the Westcott in Boston, has taken over the R & V Knight for the New England territory, due to the fact that R & V decided to close its branch at Boston.

Frank T. Windle, St. Louis, Mo., has purchased the Ford agency at Rock Island, Ill., of Warren E. Hoyt, proprietor for the last 10 years.

Edward Demoooy, general manager of the Cleveland Motor Sales Co., E. 40th street, Cleveland, O., has announced that the company has taken over distribution of the Franklin automobile in the Cleveland district. Complete parts and service stations have been established in the quarters of the company.

The Frank J. Girard Co., dealer in Autocar trucks and other lines of commercial vehicles, will soon move into larger quarters at 761 West Broad street, Columbus, O. The sales room and service station will be 150 by 120 feet.

Lexington Automobile Co., that has not had representation in Boston for nearly a year, has given its New England franchise to Aaron G. Cohen, of Hartford. Cohen has been selling Lexingtons in Connecticut for the past two years very successfully. He went to Boston and leased a place at 886 Commonwealth avenue, one of the large show rooms and service stations on Motor Row.

F. E. Dopheide, Palmyra, Ill., has sold his Ford agency and garage to Dale Dews, of Chesterfield, who has taken possession and will handle the Ford car and tractor line.

The Hade Motor Co., 622-624 Second street, Ft. Madison, Ia., had a grand opening of its three-story building, 50x110 feet, Dec. 14 and 15, with a dance on the second floor. Sales and parts rooms and offices occupy the first floor, the storage on second floor and basement with general repair shops on the third.

The Quincy, Ill., Reo Sales and Service departments temporarily housed at Fourth and Broadway, are now located in the new home, 1110 Maine street. A. E. Newberry, distributor, opened the new location this week.

William C. Specht, Durant, Ia., has completed a new concrete garage which has been opened as his sales agency and service station. He has installed a line of accessories, too.

Ray S. Kline, who is operating a tire store in Dixon, Ill., has joined with Carlyle H. Newman, of Kewanee, in leasing the garage building just finished on Ottawa avenue and River street, Dixon, with a ground floor space for 100 cars.

## Firestone Declares Dollar Dividend; Sales \$77,583,149

### \$13 a Share Earned on Common Stock as Compared to \$16.60 in 1922

AKRON, O., Dec. 22.—Firestone Tire and Rubber Co. at annual meeting declared the \$1 a share common stock dividend as generally expected in rubber circles, but its earning statement was not as large as anticipated.

Sales for the year amounted to \$77,583,149, which is an increase of 20 per cent over the previous year, but net earnings amounted to only \$6,104,992, which is only \$13 a share on common as compared with \$16.60 a share on common shown last year.

Current assets as shown in the statement amount to \$24,965,071 and current liabilities to \$8,290,234. Surplus account is reported at \$26,022,919.

Bank loans were reduced from \$12,775,000 to \$5,770,000 which is the principal reduction in the current liability item.

Sales for the past year compared with sales of \$64,507,000 reported for 1922; \$66,000,000 reported for 1921; \$114,000,000 reported for 1920 and \$91,000,000 business done during 1919.

## MEETINGS FOR DEALERS

BOSTON, Dec. 19.—L. B. Sanders, secretary of the Boston Used Car Statistical Bureau, and Floyd Ramsdell, of New York, were to be the speakers this evening at the first of a series of meetings to be presented to the automobile dealers throughout New England this winter. There were more than 300 dealers and their salesmen present.

They will have an automobile laundry, filling station and handle a limited line of supplies. The new garage is 100x150 feet and modernly equipped in every detail.

The Moyer Auto Co., Crawford, Neb., has secured the agency for the Ford in that territory. Aaron Dean and Cliff McBain, of Orient, Ia., have leased the Bevington garage at Greenfield, Ia., and will sell Overland cars in that territory.

The name of the South Side garage at Central City, Neb., has been changed to The Motor Inn. Turnby & Son are the new proprietors.

The Hughes Motor Co., of Wymore, Neb., has purchased the Ford garage of Wherry Bros.

Guy Pierce has taken over the Chevrolet agency at Kearney, Neb.

The State Motor Co. is a new addition to the automobile row at Houston, Tex. Ed R. Dewey is president and L. R. Erwin, vice-president and general manager. The company will retail and distribute Moon cars in the Houston district.

The Owen-Baskett Co., Ford and Lincoln dealer of St. Louis, has opened its new building at 3333 Washington avenue. William H. Owen is president of the company. Thomas S. Baskett, vice-president and treasurer. Albert L. O'Neill has charge of the Lincoln sales of the organization.

The following have been appointed as new Chandler dealers: Chandler-Cleveland Auto Sales Co., Waukegan, Ill.; Alexander Patrick, Lisbon Falls, Me.; E. A. Kinsey Auto Co., Niagara Falls, N. Y.; The Liebman Motor Car Co., Dayton, O.; Shollenbarger, Hamilton, O.; Fred Bradley, Punxsutawney, Pa.; Coeur d'Alene garage, Spokane, Wash.; Coombs Auto Co., North Tonawanda, N. Y.; The Dunn Motor Co., Elyria, O.; Hagerty's Garage, Fayette City, Pa.; Sam Sheneen, Ridgeway, Pa.; and Ely Motor Co., Fairmont, W. Va.



# COMING MOTOR EVENTS

## AUTOMOBILE SHOWS

Akron, Ohio.....	February	Automobile Dealers Co., Frank O. Neil, Manager.
Albany, N. Y.....	Feb. 16-23	Albany Automobile Dealers' Association, J. B. Wood and L. Y. Long, Managers.
Albuquerque, N. M.....	Feb. 7-9	Albuquerque Automobile Trade Association, E. G. Fuhrmeyer, Secretary.
Atlanta, Ga.....	Feb. 16-24	Atlanta Automobile Association, Virgil W. Shepard, Manager.
Baltimore.....	Jan. 19-26	Baltimore Automobile Dealers' Association, John E. Raine, Secretary.
Beaver, Pa.....	Jan. 23-26	Beaver County Automobile Dealers Association, James W. Doncaster, Secretary.
Boston, Mass.....	March 8-15	Boston Automobile Dealers' Association and the Commercial Motor Vehicle Association, Chester I. Campbell, Manager, 5 Park Square.
Brooklyn.....	Jan. 19-26	Brooklyn Motor Vehicle Dealers' Association.
Buffalo.....	Jan. 12-19	Buffalo Automobile Show Committee, Carlton C. Proctor, Manager.
Calumet, Mich.....	April	Central Storage Co., Jos. A. Savini, Manager.
Camden, N. J.....	March 3-8	Camden Automobile Trades Association, M. T. Ivins, Manager.
Charlotte, N. C.....	March 3-8	Charlotte Automotive Trades Association, George E. Wilson, Chairman.
Chicago.....	Jan. 26-Feb. 2	N. A. C. C. National Show, Coliseum and First Regiment Armory, S. A. Miles, Manager.
Chicago.....	Jan. 26-Feb. 2	Annual Salon, Drake Hotel.
Cincinnati.....	Feb. 9-16	Cincinnati Automobile Dealers' Association, Harry T. Gardner, Manager.
Cleveland.....	Jan. 19-26	Cleveland Automobile Dealers' and Manufacturers' Association, Herbert Buckman, Manager.
Columbus, Ohio.....	Feb. 4-9	Columbus Automobile Dealers Co., Anson B. Coates, Manager.
Dallas, Tex.....	Feb. 11-17	Dallas Automobile Trades Association.
Des Moines, Ia.....	Feb. 25-March 1	Des Moines Automobile Trades Association, C. G. Van Vleit, Manager.
Detroit, Mich.....	Jan. 19-26	Detroit Automobile Dealers' Association, H. H. Stuart, Manager.
Elmira, N. Y.....	Jan. 21-26	Elmira Automobile Merchants' Association, T. W. Keeton, Manager.
Goldsboro, N. C.....	April 21-26	Chamber of Commerce, W. C. Denmark, Manager.
Grand Rapids, Mich.....	Feb. 25-March 1	Passenger Car Dealers' Association, M. D. Elgin, Manager.
Great Falls, Mont.....	March	Montana Automobile Distributors' Association, Lyman E. Jones, Manager.
Green Bay, Wis.....	Aug. 25-30	Automotive Division, Association of Commerce, W. F. Kerwin, Manager.
Greenville, S. C.....	Feb. 25-March 1	Greenville Chamber of Commerce.
Hackensack, N. J.....	Jan. 12-19	Automotive Trade Association of Bergen County, Moe Katzman, Manager.
Hartford, Conn.....	Feb. 16-23	Hartford Automobile Dealers' Association, Arthur Fifoot, Manager.
Huntington, W. Va.....	Feb. 24-29	Huntington Automobile Dealers' Association, G. B. Roberson, Manager.
Indianapolis.....	March 3-8	Indianapolis Automobile Trade Association, John B. Orman, Manager.
Kansas City, Mo.....	Feb. 9-16	Kansas City Motor Car Dealers' Association, George A. Bond, Secretary.
Louisville, Ky.....	Feb. 18-23	Louisville Automobile Dealers' Association, George T. Holmes, Secretary.

Mankato, Minn.....	Feb. 27-Mar. 1	Mankato Automobile Dealers' Association, E. J. Dillman, Secretary.
Milwaukee.....	Jan. 19-26	Milwaukee Automotive Dealers' Association, Bart J. Ruddle, Manager.
Minneapolis, Minn.....	Feb. 2-9	Minneapolis Automobile Trade Association, Walter R. Wilmot, Manager.
Montreal, Canada.....	Jan. 19-26	Montreal Automobile Trade Association.
Muskegon, Mich.....	March 4-8	Muskegon Automobile Trade Association, J. C. Fowler, Manager.
Newark, N. J.....	Jan. 12-19	New Jersey Automobile Exhibition Co., Claud E. Holgate, Manager.
New York.....	Jan. 5-12	N. A. C. C. National Show, Eighth Coast Artillery Armory, S. A. Miles, Manager.
Oakland, Cal.....	Jan. 12-19	Alameda County Automotive Trades Association, Robert Martland, Manager.
Omaha, Neb.....	Feb. 18-23	Omaha Automobile Trade Association, A. B. Waugh, Manager.
Orlando, Fla.....	Feb. 12-16	Subtropical Midwinter Fair Association, C. E. Howard, Manager.
Philadelphia.....	Jan. 12-19	Philadelphia Automobile Trade Association, W. H. Metcalf, Manager.
Pikeville, Ky.....	Jan. 17-19	Eastern Kentucky Automobile Show, F. W. Ruddy, Secretary.
Portland, Me.....	Feb. 25-March 1	Portland Automobile Dealers' Association, Howard B. Chandler, Manager.
Portland, Ore.....	Feb. 9-15	Automobile Dealers' Association of Portland, Ralph J. Steahli, Manager.
Rochester, N. Y.....	Jan. 21-26	Rochester Automobile Dealers' Association, S. Park Harman, Manager.
Sacramento, Cal.....	Sept. 1-10	State Agricultural Society, C. E. Paine, Manager.
Saginaw, Mich.....	March 4-8	Saginaw Automobile Dealers' Association, Guy S. Gauber, Manager.
San Francisco.....	Feb. 16-23	San Francisco Automobile Dealers' Association, G. A. Wahlgreen, Manager.
Scranton, Pa.....	Feb. 4-9	Scranton Motor Trades Association, Hugh B. Andrews, Manager.
Springfield, Ill.....	March 20-22	Springfield Automobile Dealers' Association.
Springfield, Mass.....	March 3-8	Springfield Automotive Dealers' Association, Harry W. Stacy, Manager.
St. Louis.....	Feb. 17-24	St. Louis Automobile Dealers' Association, Robert E. Lee, Secretary.
Syracuse, N. Y.....	Feb. 25-March 1	Syracuse Automobile Dealers' Association, C. H. Hayes, Manager.
Toledo, Ohio.....	Feb. 4-9	Automotive Trades Association, H. V. Buelow, manager.
Toronto, Ont.....	Aug. 23-Sept. 6	Canadian Automotive Equipment Association and the Automotive Industries of Canada, Gib Robertson, Secretary.
Washington, D. C.....	March 8-15	Washington Automotive Trade Association, Walter Lambert, Secretary.
Washington Hgts., N. Y.....	March 26-31	Washington Heights Automobile Dealers' Association, H. G. Stiles, Manager.
Waterbury, Conn.....	Jan. 14-19	Waterbury Automotive Dealers' Association.

## CONVENTIONS

Albuquerque, N. M.....	May 26-31	U. S. Good Roads Exhibition.
Chicago.....	Jan. 14-31	Good Roads Show.
Detroit, Mich.....	Jan. 23	Annual Convention of the Michigan Automotive Trade Association.
Detroit, Mich.....	Jan. 22-25	S. A. E. Annual Meeting.
Montgomery, Ala.....	Jan. 21	Annual Meeting of the Alabama Automotive Trades Association.
New York City.....	Jan. 5	Annual Meeting of the Automotive Electric Association.

# The READERS' CLEARING HOUSE

## Questions & Answers on Dealers' Problems

### Half Mile Dodge Racer

Q—I wish to build a half-mile track car using a Dodge engine and chassis. What kind of pistons, number of rings, shall I use?

1—The 1924 model Dodge aluminum pistons can be used but to get slightly better efficiency by a reduction of friction we would advise an aluminum piston with piston rings not wider than  $\frac{1}{8}$  of an inch using 3 rings.

2—What gear ratio shall I use?

2—The best gear ratio can be found only by actual tryout and of course is dependent on the point at which the engine develops its maximum torque and maximum h.p. Judging from what has been done in the past in the conversion of stock cars into racers we would say that a  $3\frac{3}{4}$  to 1 ratio would be about right. However, for half mile dirt track use it may be possible to retain the original 4.17 to 1. If you use 29 by 4 inch tires, which we would advise for racing, the ratio would be a little lower, which would be 3.90 to 1 for instance.

With this ratio of 3.90 to 1 with 29 inch tires and the engine turning 3500 r.p.m., which it should do if well made and designed, it will give a car speed with plenty of power, about 76 to 78 m.p.h., which is sufficient for practically any half mile dirt track.

3—What wheel base is best?

3—This is a matter of chassis weight distribution, but the ideal length will be found some place between 88 and 98 inches, probably a good average would be in the neighborhood of 92 inches.

4—Where could I buy a single seated body speedway type?

4—This will be answered by special letter.

5—What changes should be made in the oiling system?

5—To get absolutely best results it is advisable that the crankshaft be drilled to provide force feed lubrication to the rods and main bearings. This is quite an expensive process and would cost you from \$30 to \$35 if you had the work done in an outside machine shop.

A force feed oiling system is almost necessary for long races where the engine is subjected to full load and full throttle for long distances. In races of 10 miles or less the regular splash system with about 50 per cent more clearance on both main and rod bearings and an auxiliary oiling system with one lead going to each of the cylinders, tapped in at a point just below the bottom of the piston travel, should be sufficient. Our recommendation however, is the hollow crankshaft system.

5—Is the regular radiator large enough to keep the motor cool in say a 25 mile race?

### The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

All questions are answered direct by letter, so the name and address should be given in full. This saves waiting for the answer to be published, which sometimes occurs several weeks late, depending upon the space available.

Readers' names will not be published with articles, if a request to this effect is received with the letter.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

5—Yes.

7—Give me the address of manufacturer who put out a racing head or 16 valve outfit for Dodge motors. Do you advise the use of a 16 valve racing head?

7—The address of two firms which manufacture this equipment will be supplied you by letter. Regarding the advisability of installing the overhead valves we believe that, other things being equal, valves placed in the head will give greater power than valves placed in the side. However, there are other factors besides the valve location that have to do with the speed and power of the engine, and these of course must be given some consideration. One fact that would seem to favor the use of overhead valves is that practically all of the racing cars and racing Fords use the valves located in the head.

8—Are the stock valves of the right metal formula to stand the strain of racing?

8—This we cannot answer definitely because of the fact that of all the Dodge racing cars we know of the original valves have been replaced with larger valves of different composition. The name of several firms who supply valves

especially suited to racing will be supplied you.

9—Show by diagram the proper frame construction, underslinging of springs, radiator position, etc.

9—This will require that we practically design the car for you and as the time required would be several days we will be unable to furnish this service. The regular Dodge frame construction of the late cars using half-elliptic springs in the rear would be superior to the  $\frac{3}{4}$  system. The chassis road clearance may be decreased, bringing the car close to the ground by raising the spring shackles or anchoring points higher up on the frame.

The position of the radiator, engine, etc., should be worked out by knowing the weight of each one of these units. The well balanced car is one which, when the mechanic or driver is seated in the seat, has about the same amount of weight on the front wheels as on the rear wheels and at the same time the center of gravity, horizontally, is about in a line with the center of the frame side rail. This means that the weight should not be below the frame but about in a line with axle. The car with most of the weight below the frame side members will tend to "chase" when taking a turn, the same holds true of course when the weights are above the frame in which case the car will tend to tip over.

The first step is to decide how long you want to make the car and then by using common platform scales mount the chassis with the front wheels on one scale and the rear wheels on the other and then arrange the units so that the weights will be about equal when some one is occupying the drivers seat.

10—Would a 1924 Dodge frame and undersling springs be better to use than the previous type of  $\frac{3}{4}$  elliptic?

10—Yes.

11—What would a high narrow Fiat type radiator cost me? Give names of manufacturers of such radiators.

11—This will be supplied by letter.

12—What size tires should be used, also wheels?

12—We would suggest the use of 29x4 tires, straight side, mounted on special wheels to take straight side tires without the use of locking rings. It is contrary to the policy of MOTOR AGE to recommend any article of automotive merchandise.

The general practice in revising an engine for racing is to remove the crankshaft and send it to some establishment that is equipped with a dynamic balancing machine. Placing the crankshaft in dynamic balance is one of the most necessary items and if you are not acquainted with an establishment so equipped communicate with us and we

(Continued on next page)



## Skylights Advised in This Garage

Q—I am planning to build a garage and would appreciate your advice. The lot is 60 ft. by 60 ft. with no buildings at either side. I want a one story building with plenty of light, a wash rack, battery department, tire service, accessories and gas and oil station. It is located at cross streets, as shown in rough sketch on other side.—Basil Brooks, Dresden, Tenn.

We do not know from your letter whether you want a regular drive-in filling station or a curb pump, but as there seems to be enough room for a filling station by economizing space in the garage, we are laying it out this way.

The accessory store with its show windows is lined up along the front facing the filling station and the battery room is placed in the extreme rear with the office and stockroom between. This makes a good arrangement since it gives plenty of display for accessories and customers wishing battery service may drive into the garage or receive service in the side street. The tire repair bench and tire stand is located in the front of the garage so that it would be easy for the tire repair man to promote tire sales if he has the opportunity.

The whole rear end of the garage is made into a wash rack which, of course, can be used for car storage when it is not in use as a wash rack.

While you say you want plenty of light and that your building is not surrounded by other buildings, it is not a good plan to depend on windows looking out on property that does not belong to you, because there is no telling when someone will build. We would advise the construction of a skylight over the wash rack and one at the rear of the battery room and perhaps a small one over the stockroom. This will give you much better light than you could get through side windows and there is no danger of being shut off in the future.

(Continued from preceding page)

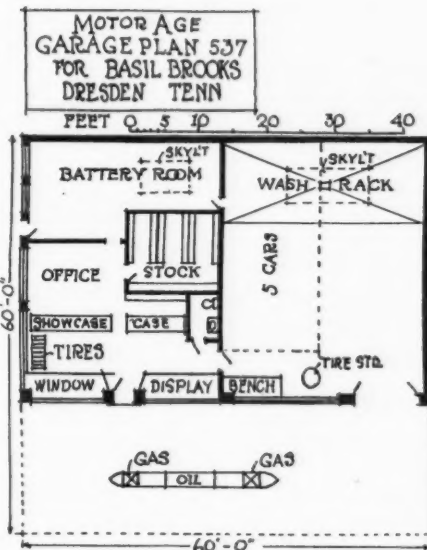
shall be pleased to give you a list of such firms.

13—In the diagram please show proper position of radiator in regard to front axle position.

13—We would suggest that you take this into consideration when laying out the chassis. Except for reasons of accessibility, the radiator location should be determined when laying out the chassis for balance. Regarding overhang, consult your bodybuilder.

14—What weight should this car be to handle nicely on a half mile track, and have enough steam to make time, after leaving a curve?

14—Other things being equal the lighter the car the more steam it will have and if properly balanced it will hold the



track as well as a heavier car. It should be possible to get the weight down to 1600 pounds with such an outfit as described in your letter.

### LIGHTING PLANT NEEDS BATTERY TO REGULATE THE VOLTAGE AND CONTROL THE SPEED

Q—We have a 32-volt Delco lighting plant that we wish to run without battery. Can this be done? We have this plant at present connected directly to lights and crank it by hand but as soon as it starts charging it loads up and then stops. Is it normal for it to do this when operated without battery? We wish to use this plant for lights and also for charging automobile batteries, and any information you can give will be appreciated.—J. A. Cessna Auto Repair Shop, Utica, Miss.

This plant is designed to be used with a 32 volt battery and will not give satisfactory operation when used in the way you describe. With only a few lamps connected the machine is likely to generate too much voltage which not only endangers the lamp filament but also supplies too much current to the ignition coil. The extra current to the ignition coil tends to cause the interrupter points to burn and spark and will make the engine miss. Then when the engine misses kerosene is drawn into the engine and is not consumed. When this happens the cylinder becomes choked up and flooded with raw fuel and the spark plugs become fouled up so the engine stops.

It is possible to use this outfit for charging batteries but it is also necessary to have a regular 32 volt battery used continuously. It would be well for you to take up this matter with your local Delco light dealer and you will find that he is able to furnish small resistances to be used in an ordinary lamp socket for charging automobile type batteries from the 32 volt battery which can

be done either with the plant running or idle.

If the plant is idle however, it is necessary to have your main 32 volt battery well charged. It is also possible to get from your Delco light dealer an adjustable rheostat for this same purpose. The greatest efficiency and the lowest cost of charging will be obtained when you have as many batteries as possible on a line at once. Four 6 volt batteries can be charged at a time and it is possible that you can charge five 6 volt batteries at once, provided the generator is running so as to hold up the main battery voltage, and get your automobile type batteries fully charged.

### PISTONS NOT RELIEVED MAY SEIZE

Q—We recently had the engine from a 1919 Franklin in our shop to have cylinders reground and new pistons fitted. Long Magnalite pistons were installed after which the engine ran fine for about 1,500 miles. The pistons then gripped the cylinder walls scoring the pistons and damaging No. 1 cylinder which necessitated regrinding this cylinder and fitting another piston of the same kind. The other five pistons were slightly scored. Pistons were fitted in accordance with Franklin specifications and after the engine had run another 700 miles the No. 1 piston again gripped the cylinder ruining the piston and leaving part of it stuck in the cylinder wall.

Each time this occurred the connecting rod bearings were not hurt at all, in fact were very oily when removed. The regrounding and fitting of pistons was done by a firm specializing in cylinder grinding. Give, if possible, cause and remedy, for this trouble.—A. E. Dudley, Welsh, La.

Ordinarily a clearance of from .0015 to .002 per inch of cylinder diameter is required and in addition to this the pistons should be relieved at the piston boss and also at the ring lands or portion of the piston between the piston rings. The clearance above specified applies to aluminum pistons.

It is quite likely either that the pistons were not given sufficient clearance or that additional material was not taken off in the vicinity of the piston boss or ring lands. We believe that you will get some information by using micrometers on the cylinder bore and also on the pistons at various points. On checking up in accordance with above suggestions you might advise us as to your findings.

### BILL FIXIT

(See page 23)

"The Fixit service organization enables Hutch to sell a car and Bill gives a lesson an generators."

### Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how

large it is expected to be.

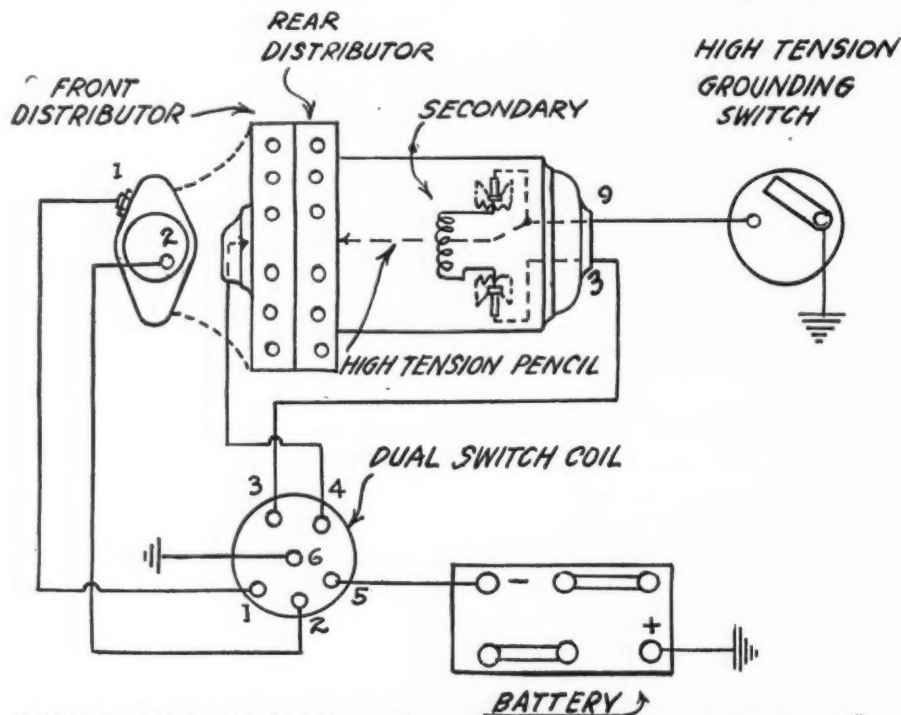
Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

How much of an accessory department is anticipated.

## Circuits of a Bosch Dual, Double Magneto



WIRING DIAGRAM BOSCH Z-R-G DOUBLE-DUAL MAGNETO

Send us diagram and instructions for installing a Bosch Dual D. R. 4 two spark magneto on a Model M 1911 Chalmers. Also advise if this magneto can be used without the battery switch coil, and still start on the magneto. Also state how to time for the best results.—Illinois Subscriber.

The illustration shown gives the diagram with all the trimmings. It is for a six cylinder magneto but is of the type you mention so you will be asked to imagine that there are only four high tension wires instead of six at each distributor. The internal circuits of the magneto, which are the same as on any other Bosch magneto, are eliminated and only those shown which are typical of this two spark magneto.

The high tension grounding switch may be obtained from any Bosch dealer and is used in starting to ground one end of the secondary winding, which makes it easier for a spark to jump at one plug only when the engine and magneto

are turning at low speed. If you wish to do away with the regular dual coil you can do so by connecting the No. 3 and No. 4 wires together.

You will have no wire on the No. 1 terminal of the magneto which is the battery interrupter, but you will need a single gang switch, of any kind, somewhat similar to the high tension grounding switch for stopping the engine.

This switch will have one terminal grounded and the other will be connected to the No. 2 terminal of the magneto. If the starter turns the engine over very slowly it might give easier starting if you would continue to use the regular dual coil as shown in the diagram.

The magneto should be timed in the retard position, referring to the points in the battery breaker even if you do not use this breaker. This gives a slight advance on the magneto breaker and a somewhat better spark for starting.

Bore of the engine 4 inches, stroke 5 inches, the piston displacement 251.3, ignition system dual, Eisemann magneto, carburetor Rayfield, fuel feed pressure, engine starter acetylene, clutch type Cone, gearset type selective located amidship, forward speeds 3, drive through straight bevel gears, rear axle floating, total gear ratio on high 4.07 to 1, wheelbase 105 inches, tires 36x3½, crankshaft bearings number and type, 3 plain, gearset bearings ball, rear axle bearings ball, front wheel bearings ball, chassis weight in pounds 2,000. Price \$1,475.00 for the roadster. We are sending you halftone illustration of the Scout model.

Motor Age supplies the Readers' Clearing House service entirely free to its subscribers.

### TRANSMISSION OF FLANDERS 20

Q—How was the transmission of the Flanders 20, which is part of rear axle, hooked up to clutch?

The transmission on the Flanders 20 is connected to the clutch in exactly the same manner as on the old Studebaker models except that the front end of the transmission has connected to it a torque tube in which runs a driveshaft. The forward end of this torque tube has a spherical housing which permits up and down and side motion and this housing is fastened to a cross member of the frame. At the front of this housing there is an alignment joint the front end of which connects to the clutch.

2—How was the torque taken care of?

2—Torque on this car is taken care of by both the torque tube and radius rods which are connected from the axle housing to a fitting on the torque tube in front.

3—Could spiral bevel gears of 3½ or 4 to 1 ratio be obtained from stock suitable for installation without making structural alterations?—Service Auto Company, Morris, Minn.

3—It is doubtful whether you will be able to secure spiral gears from stock that will fit this differential. Owing to the age of the car we would deem it unwise to go to the expense of having a special set of gears made.

### TELL US MORE AND WE CAN TELL YOU MORE

Q—Send information as to the best way to proceed to put in new main bearings in the model 90 Overland. State how to fit them to the shaft and keep the bearing caps in line with the end of the crankcase.—Lovitt Garage, LaHarpe, Ill.

We do not understand fully what is meant by, "keep the bearing caps in line with the end of the crankcase." The bearing caps, if they are genuine parts from the factory of the engine or car maker, should be of the proper length so as not to interfere with the gear case cover or any other part that is to be fastened. If you will be a little more specific we shall be able to give you more definite information.

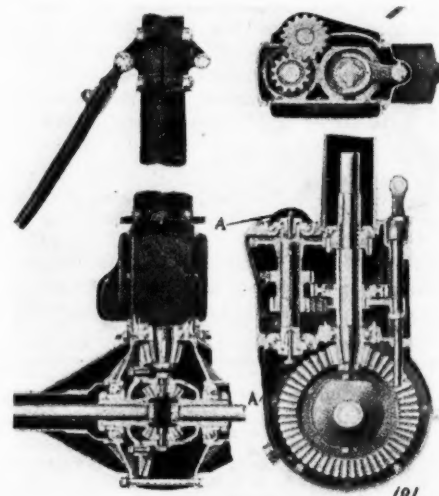
We are sending a copy of an article

that was printed in the last year Winter Service issue of Motor Age on bearing fitting.

### DATA ON AMERICAN UNDERSLUNG

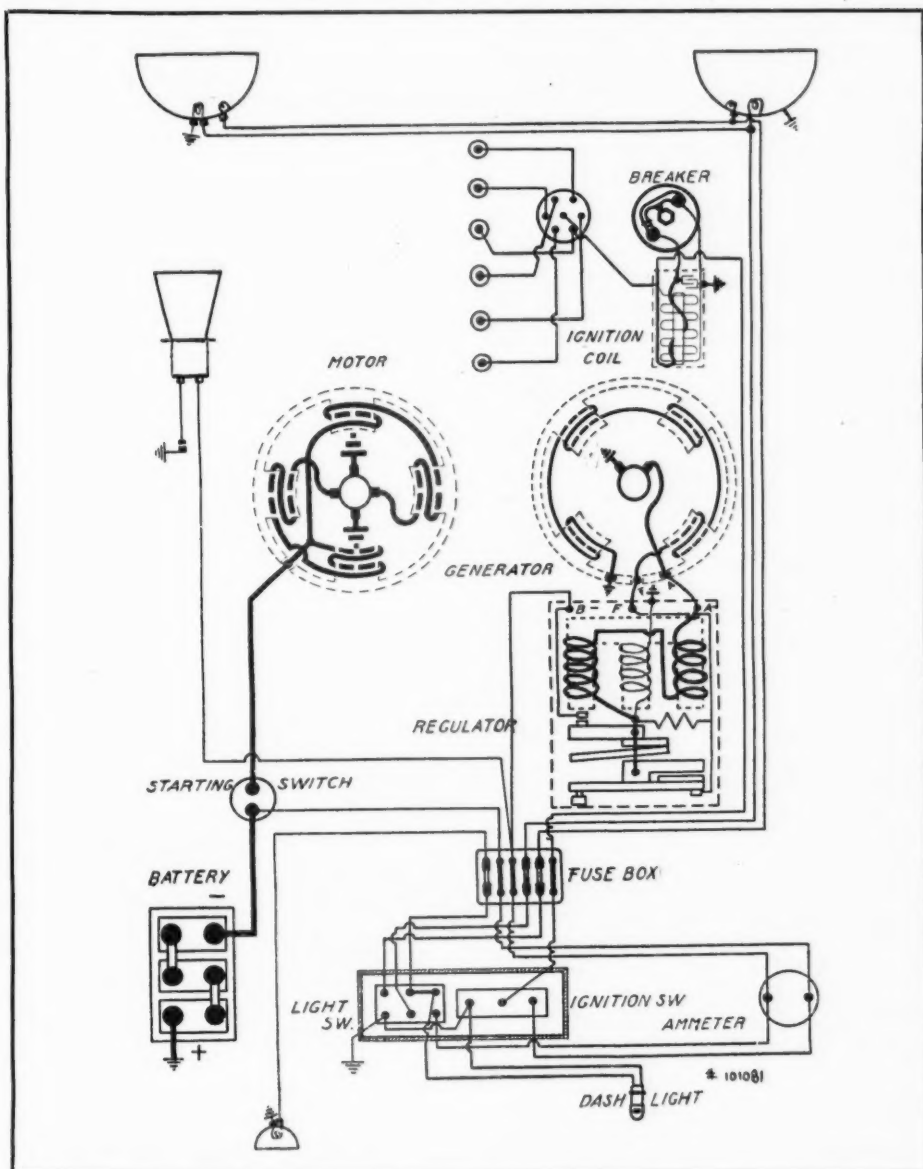
Q—Yours of the 6th inst at hand regarding information concerning American underslung motor 1905, engine 1083, roadster, 4-cylinder, Scout motor. The wheel base of this car is about 105 inches. Will you tell me the year model of this car, its h. p., original price and any other information of particular interest that you may have at hand. Would also appreciate any pictures of this car that you can spare if any. If you will send the above to this address I will be greatly indebted to you and will pay for the information if sent C. O. D. or with bill attached.—Guy Paschal, University of Virginia, Oakhurst, University, Va.

The American Scout was built in 1913.





## Wiring and Data on Lexington



Q—We have a Lexington Six car No. 6909, equipped with Continental motor and would like to know the following.—Make of rear axle and gear ratio?

1—Two models were put out in 1917 and we are not sure just which one yours is. The regular one was the Minute Man or model 6-0 and on this a Hess axle was used with a ratio of 4.75 to 1. On the Special job a Timken axle was used with a ratio of 4.08.

2—What did the car sell for when new?

2—Our information on the prices is not complete but we have the following: the four passenger roadster on model 6-0 sold for \$1,185 and we assume that the touring car was similar in price or perhaps a little higher. The sedan and coupe in the same model sold for \$1,350. In the special model the four passenger roadster sold for \$2,675 while the special 7 passenger touring sold for \$2,875.

3—What is the nearest town where parts may be obtained?

3—We do not know but suggest that you write to the Lexington Motor Company, Connersville, Ind.

4—What was the bore and stroke and oiling system used on the engine?

4—On the model 6-0 the bore and stroke were  $3\frac{1}{4} \times 4\frac{1}{2}$ , while on the model 6-P they were  $4\frac{1}{2} \times 5\frac{1}{4}$ . The oiling system was pump and splash, a plunger type pump carrying oil from a sub base to a pan into which the connecting rods dipped.

5—What was the maximum speed of the car when new?—L. J. Peterson Automotive Company, Isabel, So. Dak.

5—We would estimate from 50 to 55 m.p.h. on the model 6-0 and from 60 to 65 on the model 6-P.

## WIRING OF MITCHELL AND TIMING OF MAXWELL

Q—Can you supply diagram of oiling system on the 1918 Mitchell model D-2-40? Also illustration of the oil pump on the Mitchell.

1—We have no illustrations which would be of any particular value to you. However, the oiling system is rather simple. A pan is used in the engine which contains troughs into which the connecting rods dip. Oil is pumped from

the base of the crankcase up into this pan by means of a pump located on the left side of the engine and operated by an extra cam on the camshaft, and this is a plunger type pump.

At the same time that the pump is operating to force oil into the troughs it also raises a small plunger at the rear of the engine. This operates the plunger signal on the instrument board by which the operator is made aware of the proper working of the oiling system. When the engine is not running this plunger signal will be flush with the instrument board. When the engine is running this plunger signal should extend out of the instrument board at least  $\frac{1}{2}$  in.

2—Give valve timing of 1921 Maxwell, also piston travel.—Fox Garage, Cedar Rapids, Iowa.

2—This intake valve opens 5 degs. after upper dead center and closes 40 degs. after lower dead center. The exhaust valve opens 35 degs. before bottom dead center and closes 5 degs. after top dead center.

You will note that the closing of the exhaust valve and opening of the intake valve occur at the same time and in checking on piston travel this will be when the piston has come to its top dead center position and then has barely started down again being not more than  $\frac{1}{64}$  in. down. The piston travel is  $4\frac{1}{2}$  in. for the bore and stroke are  $3\frac{1}{4}$  and  $4\frac{1}{2}$  in. respectively.

## STARTER WANTED FOR 1912 PIERCE

Q—How can I improve the performance of a Pierce-Arrow, 36 h.p., 1912 model? The engine is hard to start when cold except by filling the priming cups. If an electric vaporizer would help, where could I secure a suitable one? Would installing a hot-spot improve the acceleration?

1—A good primer will of course help in starting and a hot-spot manifold is something that helps the operation of practically every car. Additional information along these lines will be given by separate letter.

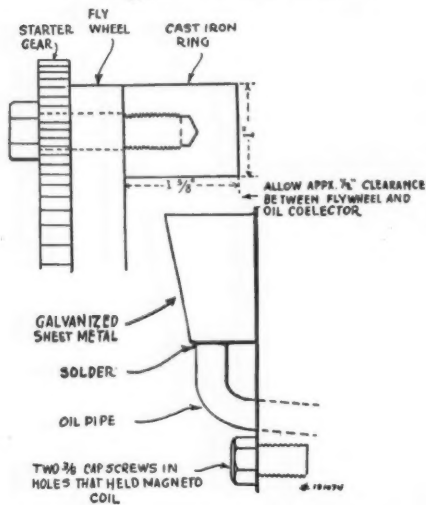
2—We intend to install a starter on this car. Would the starter from an Overland 83 be strong enough and if not what would you recommend?

2—We do not believe that this starter would be entirely suitable as it does not require as much effort to crank the Overland as it does a Pierce-Arrow. We would recommend your getting in touch with the Pierce-Arrow Motor Car Company, Buffalo, New York, to see if you cannot secure one of the starting motors used on their cars. We believe that these have a starting torque of about 18 pounds, while the Overland starting motor would probably not pull more than 12 to 13 pounds. You will also need to get a ring gear to put on the flywheel.

3—In cutting down the wheels from  $36 \times 4\frac{1}{2}$  what size would you advise?—Kenilworth Garage, Hamilton, Ont., Canada.

3—We would suggest that you refer to the passenger car specifications in Motor Age and pick out a tire size which is commonly used. Referring to a recent issue of Motor Age you will find that  $33 \times 5$  is commonly used and we would suggest that you use this size tire.

## Ford Lubrication With Magnets Left Out



Q—On page 43 of the October 18th issue of *MOTOR AGE* there is a request by Walter L. Edwards for some information relative to the substituting of a ring for the magnets on a Ford flywheel. I have had quite a bit of experience along these lines having changed six Fords including one of my own, and will be glad to give you the result of my findings.

My own car was driven over 35,000 miles and gave no trouble from lack of lubrication or balance. By experimenting I found that the use of a cast iron ring the full outside diameter of the flywheel and one inch thick and 1 1/8 in. wide bolted to the flywheel with eight 3/8 S. A. E. cap screws, through the starter gear and flywheel, gave the best results.

Normally there are 16 bolts through the flywheel to support the outer ends of the magnets. Instead of using them I drilled out eight of these holes to 3/8 inch and used eight 3/8 cap screws and found them sufficient, as the original bolts are only 1/4 inch in diameter. I cut the small funnel off the oil pipe and made a large one of galvanized iron to reach up under the ring and collect oil. The oil collector comes up within a half inch of the underside of the cast iron ring. The enclosed sketch shows the idea as above explained and I hope that it will be of some use to *MOTOR AGE* readers.—J. M. Ravenna, Kerrville, Texas.

*MOTOR AGE* wishes to express appreciation for the idea submitted. It is our personal opinion that the successful operation for a period of 35,000 miles is due to the large funnel rather than to the cast iron ring, as the use of two spools on the old ring gear retaining bolts would serve to splash considerable oil and would doubtless give good lubrication with the large funnel.

The cast iron ring has the effect of making it possible to get smooth operation of the engine at low speed, although it is not required for high speed and in fact will tend to cut down acceleration to a certain extent.

We have seen a car operate with the magnets eliminated and no such ring used and with the spark retarded it would throttle to 7 or 8 m.p.h. No enlargement of the funnel was used, however, and the lubrication was not entirely satisfactory.

### GASKET REPLACEMENT SHORTCUT

To renew the cylinder head gasket on Chevrolet motor we use a method that

is very speedy and also does a good job.

1st—Drive the car over chain hoist, remove hood and loop small chain or rope around intake and exhaust manifold.

2nd—Remove cylinder head bolts after drawing water from radiator.

3rd—Hook hoist in loop of tie around cylinder head and then raise head up enough to remove old gasket and insert new one.

4th—This saves removing rocker arm assembly, inlet and exhaust manifolds, ignition wiring and water connections.

### Changing Starter Brush on Delco Single Unit System of D K E Buicks

1st—Raise hood on both sides, disconnect battery wire, remove front cover of motor generator.

2nd—Insert a piece of wood between commutator and brush holder to raise holder as high as possible.

3rd—Take long handle screw driver and go to other side of motor and loosen the brush screws.

4th—Go back to other side of motor and remove old brush and screws with the fingers, then replace new brush by reversing the action.

5th—If you drop anything it can be easily removed by removing the ground brushes. This saves dismantling the motor generator to replace brushes only.—H. F. Dunbar, Somerset Garage, Somerset, Texas.

To show that we appreciate Mr. Dunbar's helpful advice we are printing the information as received from him.

### OILY BRUSHES GROW NO CURRENTS

Q—We have a Ford generator that will not charge until the car has been driven about five miles. We have put it in a tester. Have also cleaned the armature and have done everything any one has suggested but nothing seems to have any effect. It charges all right after it does

start. What would you suggest?—Erwin G. Miller, A Reader, Britton, Mich.

You do not say whether you have tried a new set of brushes or not. Overoiling of the Ford generator permits the oil to get onto the commutator and work into the brushes. It then has the effect of insulating the surface of the brush which makes contact with the armature until the frictional heat has melted the oil film to a certain extent so that the brush again becomes conducting. About the only possible cause of trouble aside from oil soaked brushes would be loose connections in the field or armature but these would also be likely to cause trouble after the generator started to charge.

### SPEEDING UP A TEMPLAR

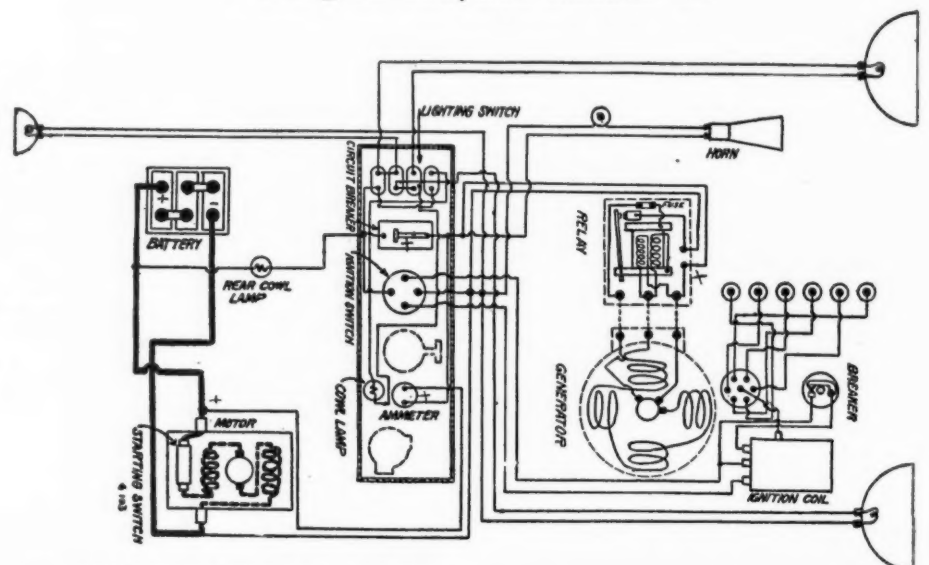
Q—We have a Templar roadster model 4-45 which will only make 55 miles per hour. Is there any way to increase the speed about 20 miles per hour as for example by installing different differential gears or light weight pistons?—M. Pope, Chicago, Ill.

Normally 55 or 60 m.p.h. is probably the top speed for this car. Increasing the speed of any car involves first working on the engine before anything is done to the gear ratio. This means that the lightest possible pistons should be used and in your particular case it might be advisable to use a carburetor 1/4 inch larger than the present size. It is also well where possible to use a small grinding wheel and smooth up the inlet ports.

Obtaining high power from the engine usually involves increasing the compression and using Benzol or some preparation in the fuel to keep it from knocking when used with high compression. On a detachable head engine the compression is sometimes increased by planing from 1/16 to 1/8 inch off of the head, trying the operation of the engine after 1/8 has been removed.

Changing the gear ratio in the rear axle will not give greater speed and may result in reduced ability to accelerate.

## Wiring of Haynes Model 45



Q—Publish wiring diagram of the Haynes 6, model 45.—Nebraska Subscriber.

The diagram requested is shown.



## Operation of Oil Pump on 1917 Oakland

Q—We have a 1917 Oakland touring car the bearings in which seem to give us considerable trouble. This summer the car was completely overhauled, the motor taken down, the cylinders reground and new pistons installed. Since this has been done the car has run about 1,500 to 2,000 miles. Now there seems to be a slight knock developing in the motor.

If you run the car 25 or 30 miles per hour everything is all right but just as soon as you start making 35 to 40 an hour or over and keep this up some of the bearings are sure to burn out. Plenty of oil has been kept in the crank case. As you know this car uses the splash oil system. The oil pump is situated near No. 6 cylinder and it is our guess that the oil pump is to blame and does not pump enough oil. We would like to know how to increase the oil pressure of this pump.—A. Lighthall, N. Y.

In the sketch shown we have given a general idea of the construction of the plunger pump used on 1917 Oakland cars. The construction may not be exactly as shown but the principles are. On the crankshaft is an eccentric which operates the plunger, making it move in an upward direction, and when the eccentric permits, a heavy spring above the plunger pushes it down again. The plunger will accordingly move up and down all the time the engine is running.

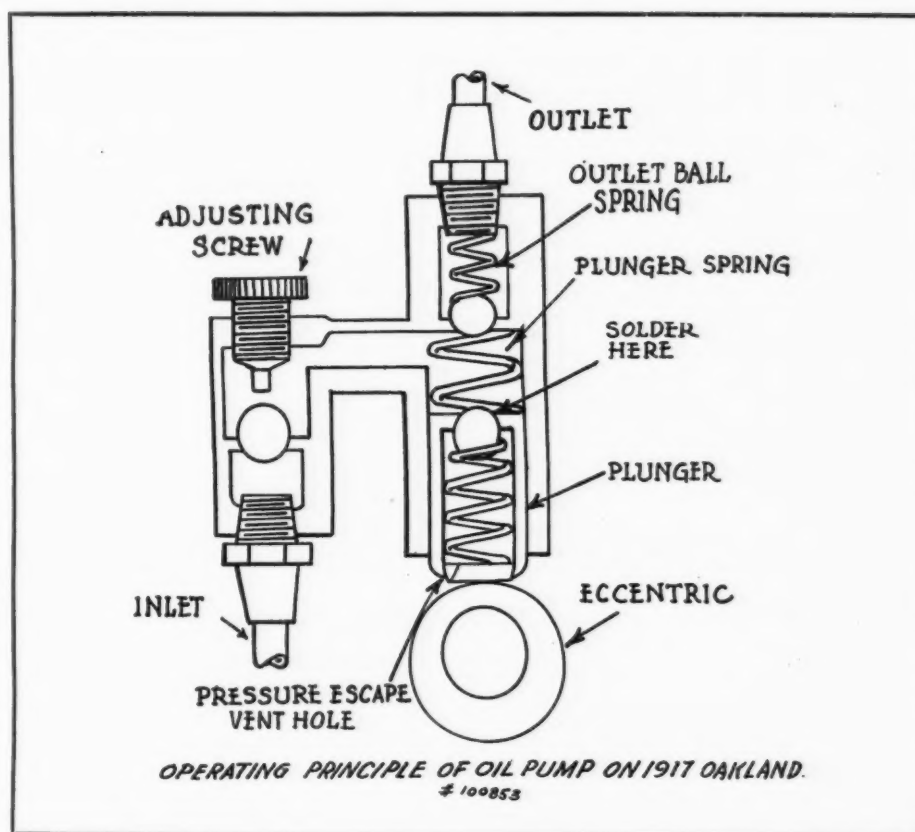
At the left is the inlet through which oil is drawn up from the bottom of the crankcase. When the plunger goes down it will tend to produce a vacuum in the oil pump and will lift the ball check above the inlet and allow oil to be drawn into the body of the pump. Then when the eccentric causes the plunger to rise again it will tend to compress the oil in the pump and will close the ball at the inlet.

The ball just below the outlet, however, will now be forced off its seat and oil will be sent out from the upper connections. From this point it goes to pans or troughs into which the connecting rods dip and this supplies lubrication from the engine. The outlet also connects to the oil gage on the cowl board of the car. The adjusting screw at the left has some effect on the amount of oil pumped by more or less limiting the rise of the ball check.

Referring now to the plunger, it will be seen that it contains a spring and another ball, but the spring is supposed to be stiff enough to normally hold the ball, so that there is no leakage of oil through the plunger. The design is intended to take care of excessively high pressure, which is supposed to push the ball down and allow the excess oil to leak out of the pressure escape vent hole.

Trouble with pumps of this type, which fail to pump sufficient oil, is likely to be due to weakness of the spring inside of the plunger. This allows a considerable quantity of oil to leak away instead of being forced from the outlet. The remedy often employed is to solder the ball securely to the upper portion of the plunger and eliminate the pressure escape path entirely.

It would, of course, also be well to see



that the plunger return spring has sufficient strength to push the plunger down when the eccentric starts to move down.

It would also be advisable to inspect the other ball checks and see that they are working properly.

### SPEEDING UP A CAR TO GET FULL VALUE FROM GOOD ROADS

Q—I have charge of 4 White buses and two touring cars for this School District and they also have a 1921 Dodge touring car here that they feel is too slow. Most of the driving is done on paved roads and this Dodge is not as fast as it should be considering the good condition of the roads. What size gears can I get for the rear axle to increase the speed about 10 m.p.h. and where could such gears be obtained?—Minn. Subscriber.

Ordinarily to speed up a car it is not advisable to change the rear gear ratio unless the engine has an excess of power under all conditions. Changing the gear ratio to get higher speed will make the car slower to pick up in speed and make it more sluggish on hills. The best practice is to work on the engine and the first step would be to use pistons of the lightest available material.

These should be selected of approximately the same weight so that there will be a minimum of vibration to the engine. The connecting rods should also be checked up to see that all of the upper ends weigh the same and that the lower ends weigh the same. Additional speed may be obtained by increasing the compression. This can be accomplished by planing off from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch from the cylinder head.  $\frac{1}{8}$  should be planed off first and the engine tried. Then an additional 1-32 should be taken off and if the operation is still unsatisfactory an additional 1-32 may be removed.

The danger of taking off too much is that the high compression will cause the engine to knock. Under such circum-

stances however, an additional gasket would doubtless overcome the trouble. With high compression it may be found desirable to use either high test gasoline or Benzol or some fuel containing Benzol. It will also be well to change from  $1\frac{1}{4}$  inch carburetor to a  $1\frac{1}{2}$  inch carburetor. We believe that the changes mentioned will enable you to get the additional 10 m.p.h.

### BETTER USE LIGHTING PLANT IF BUT FEW BATTERIES ARE TO BE CHARGED

Q—We want to charge from one to five 6-volt batteries at a time and would like to know what h. p. gas engine and what size generator we would need for this work. We have no electric light or power here so have to rely on the gas engine. We are at present using Delco light outfit but it runs too expensive for charging just a few batteries.—Clarence Brodd, Sister Bay, Wis.

To handle the range of from 1 to 5 batteries the minimum requirement in the way of a generator would be  $\frac{1}{2}$  kilowatt. Allowing for the losses in the generator a gasoline engine of 1 to  $1\frac{1}{2}$  h.p. will be required when driving the generator.

If the Delco light outfit you are using is 32 voltage the difference in cost of charging would not compensate for the extra cost of a new generator and engine. Our advice therefore, if your outfit is 32 volts, would be to retain it instead of buying a new engine and generator. If it is 110 volts the investment in the smaller generator is reasonable.

# BOOSTING ACCESSORY SALES

**W**HEN you put in your stock of spring and summer accessories, do not overlook the "sport" equipment items for open and closed cars. There are many things on the market which can no longer be considered mere luxuries. Take the man or woman who uses the car for trips to the golf club—he will find it a great convenience to have with him on the car, something that will take care of the clubs and keep from safe from the weather and thieves.

Or the man who intends using his car for hunting and fishing trips—many useful and moderately priced articles can be sold to this man that are as much a part of his equipment as the car itself. Then there is the tourist who will reach many parts of the country in his car—he is always a prospect for things which will make the trip more comfortable. Better and less expensive lights are constantly being put on the market. These, too, constitute a necessity for the motorist.

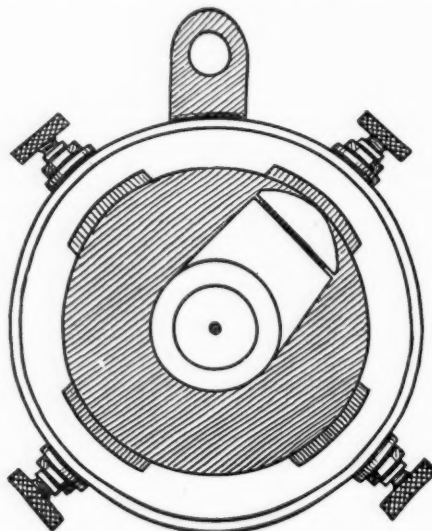
Among the many new winter accessories which permit the driver to be sure that his car or truck will be ready for use, is the Freezector, manufactured by the Improved Gauge Mfg. Co., of Syracuse, N. Y.

It is described as an accurate gage, to determine the freezing point of the alcohol solution in the radiator, having both a hot test scale and a cold test scale, so that the reading may be accurate regardless of the temperature when test is made.

To secure the reading, a quantity of the solution is placed in the glass tube, the gage is then put in the solution and immediately the temperature at which the solution will freeze is known. It is made of highly nickel plated brass, and each is packed in a separate container. List price \$3.50.

The Never-Fail Ford Brush converts the steel and fibre race of all timers into a bearing and keeps the race at all times micrometrically correct. Centrifugal force assists the brush in keeping a firm contact with the steel and fibre race and the two steel springs, used in cells made to house them, which also prevent breakage, assist this force and assure a user contact at all speeds. The steel brush is not a casting or a forging but a machined part and built of Sanderson extra special tool steel. E. W. Brink, P. O. Box 900, Cedar Rapids, Ia., is the manufacturer.

The Federal Pressed Steel Co. of Milwaukee has brought out a line of automobile bumpers in which are incorporated a number of new features. Two distinct styles are made, designated as the Metropolitan Models and the Broadway Models. The Metropolitan Models are decidedly individual in appearance, the oil-tempered, shock-absorbing, spring steel carrying a handsome front of tough open-hearth steel with two embossed sections running across the entire width



Never-Fail Ford brush



Parsons radiator shield

of the bumper. The embossed sections are finished in nickel or black enamel.

An important feature of all Federal Bumpers is the method of bolting the cushioning spring to the bumper front. Instead of bolting through this spring the spring is formed into an "eye" through which a bolt passes vertically. In addition to eliminating any weak section, where strength is important, this construction forms a swivel joint in place of a rigid joint, adding to the flexibility.

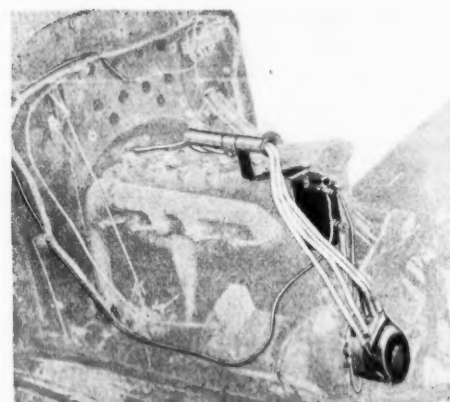
The Broadway Models are of the same construction except that the fronts are made of double spring bars two-inch and one-and-three-quarter-inch widths. They are furnished in black enamel finish or in nickel and black. The latter have another new Federal feature, the nickel portion is made up of a nicked brass sheath to prevent rusting and in addition they are readily replaceable. A special nickel plating process is used for the two clamps so that they also will not rust and detract from the appearance.

One Universal attaching bracket fits more than 60 cars. Heavy open hearth pressed steel is employed in the bracket construction, the toughness of which gives additional strength where strength is needed. Federal Pressed Steel Co., Milwaukee, Wis.

The Parsons Radiator Shield has three adjustments, with which it is possible to



Tomahawk spring lubricator



Philbrin Ford ignition

meet all weather conditions, and is equipped with a thumb-screw to make these adjustments. Once opened to any desired point, it cannot be closed by wind or jarring until the screw is loosened. The feature of the shield is that, during rain or snow, air can be admitted without the danger of the snow or rain getting into the cores. It sells at \$5 and is made by the Parsons Mfg. Co., 5301 Bellevue avenue, Detroit, Mich.

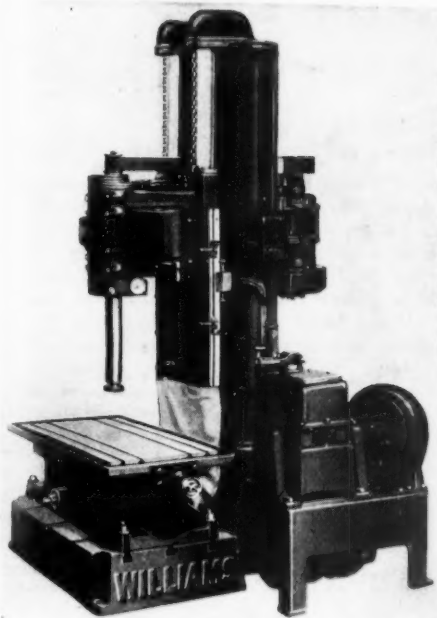
The Tomahawk Spring Lubricator is made of drop forged steel, is hardened and blued. It can be used on all cars. The cut illustrates how it penetrates the leaves of the spring spreading the soft Tomahawk graphite spring lubricant. Keystone Brass Works, Erie, Pa., are the makers.

The Philbrin Ford Ignition is the product of the Philbrin Corp., Kennet Square, Pa., and is attached to the motor as shown in the cut. The complete system as illustrated, sells at \$22.50. The distributor is priced at \$13.50, the coil at \$7 and the wiring assembly at \$2, in separate units.

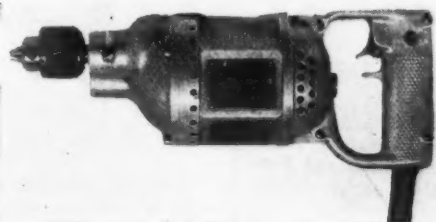
L. H. Gilmer Co., Philadelphia, Pa., manufacturers of Gilmer radiator and hose connections, calls attention to the fact that their connection is not a duck inserted one and does not contain any fabric.



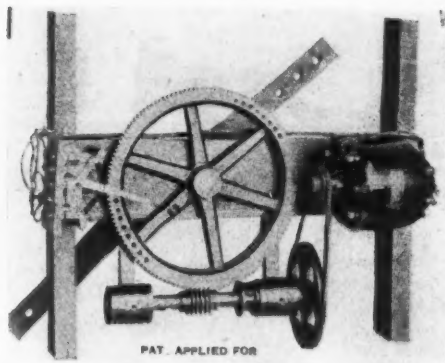
# GETTING MORE OUT of the SHOP



Williams cylinder grinder



Black & Decker drill



Peterson electric door opener

**A** HIGHER score in '24' can easily be accomplished. The shop will prove as great a factor as sales, if conducted properly. A big part of the "proper conduct" of the shop is the equipment it has. With the holiday rush over and a lull due between now and the spring, is a good time to go through the shop, renew the equipment needed and patch up the leaks. In a word, put the shop on a paying basis.

No complicated set of books is necessary to the proper conduct of the shop. Simpler methods are far more effective. You have a fair idea of what the spring and summer motorist will demand of your shop—you have read the flat rate articles in *MOTOR AGE* and you can find out in a day just what equipment you will need to meet the demand. You can prepare some ads and letters and get them in the mails and papers, then you can be sure that you will be ready to take care of anything and everything.

If you are going to be content to run along at the pace you did in 1923, you have, of course, little to worry about, but if you are going to sell cars and service and make more than expenses and a good salary—if you are going to take advantage of the bigger fields which are open to heavy hitters in 1924, you will want to bring your shop up to standard, and more. The people who bought cars last year and the years before, are going to need many kinds of service. More than that, those people are not to be "fooled" or "kidded"—they know what they want and they are looking for a place that can give it to them. If your shop is that place, you will, of course, be on top.

New cars and new models of old cars are constantly being announced. The prices of those cars are at such a low

figure, that most everyone can own the kind of car they want. This will result in but one thing for 1924—more sales. But there is not only one manufacturer bringing out cars—there are a number and the competition has reached a very fine point.

The competition in shop activities is at no less a fine point and the shop that will give the best service on its new cars, will profit accordingly in sales. Remember this and do not think because you have a good low priced car that that is all that is necessary. Others have as good a car and may have a better shop.

A portable drill having a capacity up to five-sixteenths inch in steel is announced by the Black & Decker Mfg. Co., Towson Heights, Md. It is equipped with a three jaw gear nut chuck for straight shank drill bits and has a pistol grip and trigger switch. The drill weighs seven pounds, has a no load speed of 1400 r.p.m. and is priced at \$52.

The Diamond Wheel Puller is made for all cars. To operate, simply remove hub cap and axle nut and screw the puller on the end of the axle until it fits firmly at the bottom of the hole. Then strike a sharp blow with a hammer and the jar loosens the wheel so that it is easily removed. It is sold by the Walter Eckhouse Co., Chicago.

The Peterson Electric Door Opener is best adapted to the folding and swinging type of garage doors. It is driven by a small motor. Wiring and installing instructions are furnished with each machine and it is made by the Peterson Electric Door Opener Co., Bennington, Nebr.

A cylinder grinder in which the grinding arbor is placed in a vertical position has been brought out by the Hi-Way Service Co., Elkhart, Ind. It is called the Williams Vertical Cylinder grinder and has a self-contained electric motor.

The arbor is made up of two eccentrics, one within the other, giving the grinding spindle a planetary adjustment for feeding the wheel to the work. It is driven through worm and worm wheel by a two-speed motor mounted on the side of the head.

The grinding spindle rotates at constant speed of 7,000 r.p.m., and is carried on double row annular ball bearings, which carry the weight of this shaft and care for thrust load. Center bearings are of bronze. The lower bearing at the grinding wheel end is made of bronze, tapering and adjustable to take up wear. This spindle is driven from a 2 h.p. vertical motor mounted on the rear of the head, through a flexible idler maintaining uniform belt tension. Various speeds of spindle are provided for by interchangeable pulleys on the wheel spindle and motor shaft enabling the use of large or small diameter grinding wheels for grinding different size holes.

This unit head and power plant, at the will of the operator travels up and down between heavy columns on V-ways of liberal dimensions, with heavy gibs and counterbalanced by weights in each column. The dialing mechanism for adjusting eccentrics is simple and easy to read, allowing the operator at all times to know the size he is grinding. A hydraulic gear pump is mounted at the side of the column and is driven by the motor. Oil is circulated under pressure to a hydraulic ram, mounted in the center of the twin column directly under and in the center of the unit head, giving a balance to the head travel.

The suction fan, for removing chips and dust, is mounted on the base carrying the "Oilgear" and is driven from the same motor through a belt.

In grinding large single cylinders the universal table is removed from the "T" slotted base and the work is clamped direct on the base. A universal table is used for quick set-up of work, readily cranked in and out and lengthways for centering work. The floor space required is 49x42 inches and the connection of power wire is all that is necessary.

In the "Bill Fixit" article this week, you will find some interesting reading. "Bill's" is one of those versatile characters who can get around a lot of situations and perhaps he will help you. Electrical "dope" is his specialty and you will find the material instructive, too.

# SQUEEKS & RATTLES

A Higher Score in '24!

"PEOPLE don't seem to care how they look, just so they go riding," says an official of the Retail Clothiers' Association, the members of which have had a hard time selling clothes.

Automobiles are versatile, all right.

But who's got time to put clothes on if they have a motor car?

Time and automobiles wait for no man.

"One suit of clothes and three automobiles," is the motto now.

Few people go to their own homes to spend a quiet evening and get all dressed up. It's the same with a car. If people go out for a ride in their own car, they just "make themselves to home" and go as they are.

Only one thing wrong with automobiles and that is that room has not been provided for the kitchen stove in the rear seat where grandpa can park his dogs and be as much to home as grand-daughter with her vanity case.

BUT many a grandpa has found that the foot pedals are excellent substitutes for the stove, and they're much more flashy.

SO why buy clothes? A bathing suit is all that is necessary.

"WHEN is that automobile painter going to finish your car?"

"Tomorrow—always tomorrow. I think he's one of those Futurists we hear about."

MRS. BLAKE: "Husbands are strange creatures."

Her Friend: "Aren't they? John has to ask his garage man a hundred questions about the brand and manufacture before he puts a drop of oil into the car, but he never asks his bootlegger a single question for fear of hurting his feelings."—New York Sun.

M. R. MELLON has proposed a cut in income taxes. It won't affect us any—if we paid a tax on our income, we'd have to mortgage those few articles of clothing that we have and stay in the house for a year.

BUT then we'd have our car, and, as some one has said, "Why worry about clothes, when you have an automobile?"

## Teach This to the Prospect's Kid

Paddy cake, paddy cake, baker's man,  
I got a daddy that drives a tin can;  
He gives it the gas and he gives it the spark  
And he drives it around from dawn until dark.

To market, to market, a-gallop, a-trot;  
The ignition is bad and the gas hickey shot,  
So why buy a horn, when she rattles so well.  
When the old engine dies, the old buss goes to —.

—Hap.

## Galloping Along

By "Kay Em" Roberts

I sing a song of cheerful strain because my pep is great; no one has heard me yet complain—not much, at any rate—and if I have an ache or pain I keep my face on straight. I venture forth on stormy days the same as when the sun is shooting down its soothing rays, I'm ever on the run and spend my time in fruitful ways, my work is never done. Some guys I know bemoan the day when clouds hang overhead, they lose their pep and trill no lay, their hearts are as of lead, and they announce "we'll hit the hay," and forthwith go to bed. No motor busses would be sold if we high-pressure guys let rain and snow and heat and cold bring forth the hopeless sighs, and we would gather in no gold if weather filled our eyes.

## Queered

Lawyer: "Well, what shall we ask for—trial by judge or jury?"

Client: "Take the judge, Doc. I've fixed nearly every car in town."—Colonel.

## An Elegy Written in a Tourist Camping Ground

THE klaxon sounds the knell of parting day,  
Some late arrivals through the dust clouds creep,  
And three hours after we have hit the hay  
The noise calms down so we can get to sleep.

Save where, from yonder pennant-clad sedan,  
The radio set emits its raucous squeal,  
And, underneath a near-by light, a man  
Pounds until daylight on a busted wheel.

Beneath those tattered tops, those patent tents,  
Where falls the dust into each sunburned pore,  
Each on his folding bed of slight expense,  
The rude explorers of the highway snore.

Let not ambition mock their creaky cars,  
Their khaki clothes, of vintages obscure,  
Nor grandeur view, with hauteur like a czar's,  
The short and simple flivvers of the poor.

The boast of shiny paint, the pomp of power,  
And all that charms the motoristic fop,  
Await like the inevitable hour—  
The paths of touring lead but to the shop.

Can streamline hood or silver-plated hubs  
Back to its mansion call the missing spark?  
Can plush upholstery foil the clumsy dubs  
Who bang into your fenders in the dark?

Full many a boob of purest ray serene  
Succumbs each summer to the touring itch;  
Full many a car is doomed to blush unseen,  
And waste its sweetness in a western ditch.

—Spokane Spokesman-Review.

THE New York show opens Saturday. Squeeks & Rattles will, of course, have its staff of war correspondents on the scene to grab off, first-hand, those things which are of the most interest.

THERE seems to be a shortage of low priced cars.

THERE'LL be a shortage of manufacturers of those cars pretty soon, if they keep doing this thing of following Barnum.

THEY'RE forcing all of the high-priced cars down. And what will us Rolls-Royce buyers do, if they cheapen the car to meet competition?

NOW that the time for wishing all sorts of good things to people for the New Year, let's get out a series of collection letters to swell the income tax return.

"HOLDS Government Can't Seize Liquor Carrying Automobiles."

We knew the stuff was strong but never suspected that it could carry automobiles.

ALL the world's a stage and grade crossings are exits.—Ohio Motorist.

## Headlines

"Big Demand for Space"—If a desperate shortage is experienced, a great number of heads are still available.

## Another Headline

"Dam Detour Arousing Motorists"—in the Brookville, Pa., American.

And the Detroit Motorist arises to remark that touring, these days, seems to be nothing more than just one dam detour after another, anyway.

—LEW BRICATION



## Current Motor Truck Specifications

(This list comprises trucks distributed on a national basis)

MAKE AND MODEL	Tons Capacity	ENGINE		Clutch Make	Gearset Make	REAR AXLE		TIRES	
		Price	Make & Model			Make & Model	Final Drive	Front	Rear
Acme.....20	1-1/2		Co-N.....3 1/2x5	B&B.	Cot.	Ti-6250.	WO.	34x5n	34x5n
Acme.....30	1-1/2		Co-J4.....3 1/2x5	B&B.	Cot.	Ti-6352.	WO.	34x3 1/2	34x5
Acme.....40	1 1/2-2		Co-J4.....3 1/2x5	B&B.	Cot.	Ti-6460.	WO.	34x3 1/2	34x5
Acme.....60	2 1/2-3		Co-K4.....4 1/2x5 1/2	B&B.	Cot.	Ti-6560.	WO.	36x4	36x7
Acme.....90	3 1/2-4 1/2		Co-L4.....4 1/2x5 1/2	B&B.	Cot.	Ti-6660.	WO.	36x5	40x10
Acme.....125	5-6 1/2		Co-B5.....4 1/2x6	B&B.	Cot.	Ti-6760.	WO.	36x5	40x12
Amer. La France	2 1/2	\$3950	Own.....4 1/2x6	Own.	Own.	Own.	DR.	36x4	36x7
Amer. La France	3 1/2	4950	Own.....4 1/2x6	Own.	Own.	Own.	WO.	36x5	36x5
Amer. La France	5	5500	Own.....4 1/2x6	Own.	Own.	Own.	WO.	36x6	40x6
Armleder.....21	1 1/2		Bu-GTU.....4 1/2x5 1/2	B-L.	Ful.	Ti-6460.	WO.	34x3 1/2	34x6
Armleder HWB	2 1/2		Bu-HTU.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4k	36x4dk
Armleder HWC	2 1/2		Co-C4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4k	36x4dk
Armleder KWB	3 1/2		Co-YTU.....4 1/2x6	B-L.	B-L.	Ti-6660.	WO.	36x5k	36x5dk
Armleder KWC	3 1/2		Co-E4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6660.	WO.	36x5k	36x5dk
Atterbury.....20R	1 1/2-2	2475	Co-J4.....3 1/2x5	Ful.	Ful.	Ti-6460.	WO.	34x4k	34x6
Atterbury.....22C	1 1/2-2	3375	Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4k	36x4dk
Atterbury.....22D	2 1/2-3	4275	Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6660.	WO.	36x5	40x6d
Atterbury.....8E	5-6	4975	Co-B2.....4 1/2x6	B-L.	B-L.	Ti-6760.	WO.	36x6	40x7d
Autocar.....21	1 1/2-2	2200	Own.....4 1/2x5 1/2	Own.	Own.	Own.	DR.	34x4	34x6
Autocar.....27	3-4	3450	Own.....4 1/2x6	Own.	Own.	Own.	DR.	34x5	36x8
Autocar.....26	4-6	4650	Own.....4 1/2x6 1/2	Own.	Own.	Own.	DR.	34x6	36x12
Available.....JH	1 1/2	2450	He-O.....4x5	B-L.	B-L.	Ti-6460.	WO.	36x3 1/2	36x5
Available.....H	2 1/2	3160	He-O.....4x5	B-L.	B-L.	Ti-6560.	WO.	36x4	36x8
Available.....H	3 1/2	4175	He-MU3.....4 1/2x5 1/2	B-L.	B-L.	Ti-6660.	WO.	36x5	40x5d
Available.....H	5	5375	He-T3.....5x6	B-L.	B-L.	Ti-6760.	WO.	36x6	40x12
Avery.....1-1/4			Own.....3x4	Own.	Own.	To-OX2.	IG.	34x5n	34x5n
Bessemer.....G1	1 1/2	1450	Co-N.....3 1/2x5	Ful.	Ful.	To-A.....IG.	35x5n	35x5n	
Bessemer.....H2	1 1/2	1995	Co-N.....3 1/2x5	B&B.	Bak.	LM-7150	DR.	36x3 1/2	36x5
Bessemer.....J2	2 1/2	2895	Co-C2.....4 1/2x5 1/2	B&B.	B-L.	LM-7250	DR.	36x4	36x4d
Bessemer.....K2	3 1/2	3495	Co-E7.....4 1/2x5 1/2	B&B.	B-L.	To-E.....IG.	36x5	36x10	
Bethlehem.....KN1	1	1385	Own.....3 1/2x5	B&B.	Det.	Ea-1000	SB.	35x5n	35x5n
Bethlehem.....GN2	1	2185	Own.....4x5 1/2	B&B.	Det.	Wi-60A.	DR.	34x4	34x6
Bethlehem.....HN3	1	2985	Own.....4x5 1/2	Ful.	Ful.	Wi-88E.	DR.	36x4	36x6
Brookway.....E2	1		Wi-SU.....4x5	B-L.	B-L.	Co-5200	SB.	33x5n	33x5n
Brookway.....S1	1 1/2		Wi-SU.....4x5	B-L.	B-L.	Ti-6460.	WO.	36x4	36x6
Brookway.....K	2 1/2		Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4	36x8
Brookway.....R	3 1/2		Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6660.	WO.	36x5	36x5d
Brookway.....T5	5		Co-B5.....4 1/2x6	B-L.	B-L.	Ti-6760.	WO.	36x6	40x7d
Buick.....23-4-SD	3/4	945	Own.....3 1/2x4 1/2	Own.	Own.	SB.	31x4n	31x4n	
Case.....TR2	2		Own.....4 1/2x5 1/2	TD.	Own.	To-C139.	IG.	36x6n	38x7n
Chevrolet.....Supr	1 1/2	395	Own.....3 1/2x4	Own.	Own.	SB.	30x3 1/2	30x3 1/2	
Chevrolet.....Uit	1 1/2	550	Own.....3 1/2x4	Own.	Own.	SB.	31x4n	34x4 1/2	
Clinton.....20	1-1/4	1980	Bu-WTU.....3 1/2x5 1/2	B-L.	B-L.	Ti-6250.	WO.	34x5n	34x5n
Clinton.....45	1 1/2-2	2840	Bu-GTU.....3 1/2x5 1/2	B-L.	B-L.	Ti-6460.	WO.	34x4	34x3 1/2
Clinton.....65	2 1/2-3	3480	Bu-ETU.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	34x5	34x5d
Clinton.....90	3 1/2-4 1/2	4160	Bu-YTU.....4 1/2x6	B-L.	B-L.	Ti-6660.	WO.	36x6	36x6d
Clinton.....120	5-7	4890	Bu-BTU.....5 1/2x6 1/2	B-L.	B-L.	Ti-6760.	WO.	36x6	36x7d
Clydesdale.....10A	1 1/2	1785	Co-N.....3 1/2x5	B&B.	B-L.	Ti-6250.	SB.	34x5n	34x5n
Clydesdale.....8	2 1/2	2650	Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6460.	WO.	36x4	36x7
Clydesdale.....6 1/2	3	3300	Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x5	36x5d
Clydesdale.....4 1/2	4	4200	Co-B5.....4 1/2x6	B-L.	B-L.	Ti-6660.	WO.	36x6	40x6d
Clydesdale.....2 1/2	5	4500	Co-B5.....4 1/2x6	B-L.	B-L.	Ti-6760.	WO.	36x7	40x7d
Commerce.....9 1/2-1 1/4			Co-N.....3 1/2x5	Det.	Det.	Sa-D16.	SB.	33x5n	33x5n
Commerce.....25	1 1/2		Co-J4.....3 1/2x5	B-L.	B-L.	Ti-6560.	WO.	36x3 1/2	36x5k
Commerce.....25 1/2	1 1/2		Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6660.	WO.	36x4k	36x7k
Corbett.....S1	1 1/2		HS-30.....3 1/2x5	B-L.	B-L.	Sh-1002.	WO.	34x4 1/2	34x4 1/2
Corbett.....E1	1 1/2		Co-N.....3 1/2x5	B-L.	B-L.	Sh-1002.	WO.	34x3 1/2	34x4k
Corbett.....D1	1 1/2		Co-J4.....3 1/2x5	B-L.	B-L.	Sh-1501.	WO.	34x3 1/2	34x5k
Corbett.....C2	2 1/2		Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Sh-103.	WO.	36x3 1/2	36x7k
Corbett.....B2	2 1/2		Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Sh-21.	WO.	36x4k	36x8
Corbett.....R3	3 1/2		Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Sh-21.	WO.	36x4	36x8
Corbett.....A3-4	4		Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Sh-32.	WO.	36x5	36x10
Corbett.....AA5	5		Co-B5.....4 1/2x6	Del.	B-L.	Sh-51.	WO.	36x6	40x12
Day-Elder.....AN1	1 1/2		Bu-WTU.....3 1/2x5 1/2	B-L.	B-L.	Ti-6352.	WO.	34x3 1/2	34x4
Day-Elder.....BN2	2 1/2		Co-J4.....3 1/2x5	B-L.	B-L.	Ti-6460.	WO.	34x3 1/2	34x5
Day-Elder.....CN3	3 1/2		Co-K4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4	36x7
Day-Elder.....FN4	4 1/2		Bu-HTU.....4 1/2x5 1/2	B-L.	B-L.	Ti-6560.	WO.	36x4	36x5d
Day-Elder.....EN5-0	5-0		Co-L4.....4 1/2x5 1/2	B-L.	B-L.	Ti-6760.	WO.	36x5	40x6d
Dearborn.....E1	1 1/2	1600	Bu-MU.....3 1/2x5 1/2	Ful.	Ful.	Wi.....WO.	35x5n	35x5n	
Dearborn.....F1 1/2	1 1/2	1990	Bu-WU.....3 1/2x5 1/2	Ful.	Ful.	Wi.....WO.	34x4	34x5	
Dearborn.....482	2 1/2	2390	Bu-WU.....3 1/2x5 1/2	Ful.	Ful.	Wi.....WO.	34x4 1/2	34x7	
Denby.....31 1/2-1 1/4	1 1/4	1485	Co-N.....3 1/2x5	Ful.	Ful.	Cl-B300*	SB.	34x5n	34x5n
Denby.....33 1/2	1 1/2	2375	Co-J4.....3 1/2x5	Ful.	Ful.	Cl-1D.	IG.	35x5n	38x7n
Denby.....35 1/2	2 1/2	2975	Co-K4.....4 1/2x5 1/2	Ful.	Ful.	Cl-2D.	IG.	36x4	36x8
Denby.....27 1/2	3 1/2	3695	Co-L4.....4 1/2x5 1/2	Ful.	Ful.	Cl-3D.	IG.	36x5	36x5d
Denby.....210 1/2	4 1/2	4295	Co-B5.....4 1/2x6	Ful.	Ful.	Cl-5D.	IG.	36x6	40x6d
Denby.....214 1/2	5	4945	Co-B5.....4 1/2x6	Ful.	Ful.	Ru.....IG.	36x6	40x14	
Dependable.....CD 1 1/2-2	1 1/2-2	2350	Bu-CTU.....3 1/2x5 1/2	Ful.	Ful.	Wi-800J.	WO.	34x5	34x8
Dependable.....EG 2 1/2-3	2 1/2-3	2950	Bu-ETU.....4 1/2x5 1/2	Ful.	Ful.	Wi-900C.	WO.	36x5	36x10
Diamond T.....75 1/2-1	1		He-O.....4x5	Cov.	Cov.	Co-52021	SB.	33x5n	33x5n
Diamond T.....O3 1-1 1/4	1-1 1/4		Hi-700.....3 1/2x5 1/2	Cov.	Own.	Own.	WO.	36x3 1/2	36x4
Diamond T.....T1 1 1/2	1 1/2		Hi-700.....3 1/2x5 1/2	Cov.	Cov.	Ti-6460.	WO.	36x3 1/2	36x5
Diamond T.....U2 2 1/2	2 1/2		Hi-1400.....4 1/2x5 1/2	Cov.	Cov.	Ti-6560.	WO.	36x4k	36x8k
Diamond T.....K3 1/2	3 1/2		Hi-1500.....4 1/2x5 1/2	Cov.	Cov.	Ti-6660.	WO.	36x5	36x5d
Diamond T.....EL5	5		Hi-200.....4 1/2x5 1/2	Cov.	Cov.	Ti-6760.	WO.	36x6	40x6d
Diamond T.....S5	5		Hi-B2.....4 1/2x6	B-L.	B-L.	Ti-6760.	WO.	36x6	40x6d
Dodge Brothers.....3/4	3/4	730	Own.....3 1/2x4 1/2	Own.	Own.	Own.	SB.	32x4n	32x4n

\*—Make Optional  
†—Short wheelbase model  
‡—6 cylinders  
§—All 4 cyl. engines unless otherwise specified  
††—Truck Tractor  
\*\*—Front wheel drive  
b—price includes body or cab  
d—dual  
k—pneumatic tires optional at extra cost  
n—pneumatic tires standard

ENGINE:  
Bu—Buda  
Co—Continental  
Do—Dodge  
He—Hercules  
Hi—Hinkley  
HS—Herschell-Spillman  
Ly—Lycoming  
MI—Midwest  
Wa—Wankensha  
We—Weideley  
Wi—Wisconsin

CLUTCH & GEARSET  
B&B—Borg & Beck  
B-L—Brown-Lipe  
Bak—Baker  
Cam—Campbell  
Cot—Cotta  
Cov—Covart  
Del—Detroit  
Det—Detroit  
Ful—Fuller  
H-S—Hele-Shaw  
Hoo—Hoosier  
M&E—Merchant & Evans

Mec—Mechanics  
Mun—Muncie  
T.D.—Twin Disc  
War—Warner  
REAR AXLE:  
Am—American  
Cl—Clark  
Co—Columbia  
Du—Durstion  
Ea—Eaton  
Fl—Flint  
LM—L-M

Ru—Russell  
Sa—Salsbury  
Sh—Sheldon  
Ti—Timken  
To—Torbenen  
Wi—Walker  
Wi—Wisconsin  
Ch—Chain  
DR—Double Reduction  
IG—Internal Gear  
SB—Spiral Bevel  
SP—Straight Bevel  
WO—Worm

## Current Motor Truck Specifications—Continued

(This list comprises trucks distributed on a national basis)

MAKE AND MODEL	Tons Capacity	Price	ENGINE		REAR AXLE		TIRES		MAKE AND MODEL	Tons Capacity	Price	ENGINE		REAR AXLE		TIRES							
			Make & Model	Bore & Stroke	Clutch Make	Gearset Make	Make & Model	Final Drive				Make & Model	Bore & Stroke	Clutch Make	Gearset Make	Make & Model	Final Drive	Front	Rear				
Kissel	4	\$3625	Own.	4 1/2 x 5 1/2	War.	War.	Sh-31.	WO.	36x5	36x12	Schacht	5	\$4600	Wi-VAU	4 1/2 x 6	B&B.	Own.	WO.	36x5	40x7d			
Larrabee	X2	1785	Co-J4.	3 3/4 x 4 1/2	B-L.	B-L.	Sh-1480.	SB.	34x5n	34x5n	Selden	30C	2375	Co-J4.	3 3/4 x 5	B-L.	B-L.	TI.	WO.	34x3 1/2	34x5k		
Larrabee	J4	2400	Co-J4.	3 3/4 x 5	B-L.	B-L.	Sh-1501.	WO.	34x3 1/2	34x5k	Selden	50B	2125	Co-K4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	WO.	36x4k	36x7k		
Larrabee	K5	3550	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	Sh-22.	WO.	36x4	36x8	Selden	53B	2125	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	WO.	36x4k	36x7k		
Larrabee	L4	4100	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	Sh-31.	WO.	36x5	36x10	Selden	70B	3125	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	WO.	36x5k	36x10k		
Maccar.	EX	114	Wi-SU.	4x5	B-L.	B-L.	Sh-1526e	SB.	34x5n	34x5n	Selden	73B	3125	Co-B5.	4 1/2 x 6	B-L.	B-L.	TI.	WO.	36x5k	36x10k		
Maccar.	L-1	114	Wi-TAU	4x6	B-L.	B-L.	Ti-6460.	WO.	36x4	36x6	Selden	90A	5	Co-B5.	4 1/2 x 6	Del.	B-L.	TI.	WO.	36x6k	40x12		
Maccar.	HT	114	Wi-TAU	4x6	B-L.	B-L.	Ti-6560.	WO.	36x4	36x4d	Service	25	1 1/2	Bu-WTU	3 3/4 x 5 1/2	B-L.	B-L.	Es-1000.	SB.	34x5n	34x5n		
Maccar.	H-13	114	Wi-UAU	4 1/2 x 6	B-L.	B-L.	Ti-6560.	WO.	36x4	36x5d	Service	33	1 1/2	Bu-GBU	4 1/2 x 5 1/2	B&B.	B-L.	TI.	Ti-6352.	WO.	34x3 1/2	34x6	
Maccar.	M-2	114	Wi-UAU	4 1/2 x 6	B-L.	B-L.	Ti-6660.	WO.	36x5	36x6d	Service	42	2	Bu-EBU	4 1/2 x 5 1/2	B&B.	B-L.	TI.	Ti-6460.	WO.	36x4	36x7	
Maccar.	G-15	114	Wi-UAU	4 1/2 x 6	B-L.	B-L.	Ti-6760.	WO.	36x5	40x6d	Service	61	3	Bu-EBU	4 1/2 x 5 1/2	B&B.	B-L.	TI.	Ti-6560.	WO.	36x4	36x8	
MacDonald.	O-3	5500b	Bu-WTU	3 3/4 x 5 1/2	B-L.	B-L.	**Own.	IG.	36x10	36x10	Service	81	4	Bu-YBU	4 1/2 x 5 1/2	B&B.	B-L.	TI.	Ti-6660.	WO.	36x5	36x10	
MacDonald.	A-7	8000b	Bu-YTU	4 1/2 x 6	B-L.	B-L.	**Own.	IG.	40x7	40x14	Service	103	6	Bu-YBU	4 1/2 x 6	B&B.	B-L.	TI.	Ti-6760.	WO.	36x6	40x12	
Mack	AB	3000	Own.	4x5	Own.	Own.	Own.	Ch.	36x4	36x3 1/2	Signal	NF	13 1/2	Co-J4.	3 3/4 x 5	B-L.	B-L.	TI.	Ti-6352.	WO.	34x5n	36x6n	
Mack	AB	3450	Own.	4x5	Own.	Own.	Own.	DR.	36x4	36x3 1/2	Signal	H	2 1/2	Co-K4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6460.	WO.	34x4	36x6	
Mack	AB	3300	Own.	4 1/2 x 5	Own.	Own.	Own.	Ch.	36x4	36x4	Signal	J	3 1/2	Co-K4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6560.	WO.	34x4	36x8	
Mack	AB	3750	Own.	4 1/2 x 5	Own.	Own.	Own.	DR.	36x4	36x4d	Signal	M	5	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6660.	WO.	36x5	40x10	
Mack	AB	3400	Own.	4 1/2 x 5	Own.	Own.	Own.	Ch.	36x4	36x4d	Signal	R	7 1/2	Co-B5.	4 1/2 x 6	B-L.	B-L.	TI.	Ti-6760.	WO.	36x6	40x12	
Mack	AB	3850	Own.	4 1/2 x 5	Own.	Own.	Own.	DR.	36x4	36x4d	Standard	75	1 1/2	Co-N.	3 3/4 x 5	B-L.	B-L.	TI.	Ti-6250.	WO.	33x5n	33x5n	
Mack	AC	4950	Own.	5x6	Own.	Own.	Own.	Ch.	36x5	40x5d	Standard	1 1/2	1 1/2	Co-N.	3 3/4 x 5	B-L.	B-L.	TI.	Ti-6352.	WO.	34x3 1/2	34x5	
Mack	AC	5500	Own.	5x6	Own.	Own.	Own.	Ch.	36x6	40x6d	Standard	2 1/2	1 1/2	Co-K4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6560.	WO.	36x4	36x8	
Mack	AC	5750	Own.	5x6	Own.	Own.	Own.	Ch.	36x6	40x12	Standard	3 1/2	3 1/2	Co-L4.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6660.	WO.	36x5	36x12	
Mack	AC	6000	Own.	5x6	Own.	Own.	Own.	Ch.	36x7	40x7d	Standard	5	5	Co-B5.	4 1/2 x 6	B-L.	B-L.	TI.	Ti-6760.	WO.	36x6	40x14	
Mack	AC	6400	Own.	5 1/2 x 5	Own.	Own.	Own.	Ch.	36x4	36x4	Star	405	4	Co-Spec.	4 1/2 x 5 1/2	Own.	War.	Ti-Spec.	SB.	36x3 1/2	36x5k		
Mack	AC	4950	Own.	5x6	Own.	Own.	Own.	Ch.	36x5	40x5d	Sterling	1 1/2	1 1/2	3240	Wa-FU.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6460.	WO.	36x3 1/2	36x5k
Mack	AC	5500	Own.	5x6	Own.	Own.	Own.	Ch.	36x6	40x6d	Sterling	2 1/2	2 1/2	3440	Wa-FU.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6560.	WO.	36x4k	36x6k
Mack	AC	5750	Own.	5x6	Own.	Own.	Own.	Ch.	36x6	40x12	Sterling	3 1/2	3 1/2	3700	Wa-CU.	4 1/2 x 5 1/2	B-L.	B-L.	TI.	Ti-6560.	WO.	36x4k	36x4k
Mack	AC	6000	Own.	5x6	Own.	Own.	Own.	Ch.	36x7	40x7d	Sterling	5	5	4750	Wa-DU.	4 1/2 x 6 1/2	H-S.	Own.	TI.	Ti-6660.	WO.	36x5	40x5d
Mason	11	1295	He.	4x5	Hoo.	War.	FL.	SB.	34x5n	34x5n	Sterling	5	5	5400	Wa-EU.	5x6 1/2	H-S.	Own.	TI.	Ti-6760.	WO.	36x6	40x6d
Master	11	114	Bu-WTU	3 3/4 x 5 1/2	Ful.	Ful.	Ti-5511.	SB.	33x5n	33x5n	Sterling	EHD	7 1/2	6500	Wa-EU.	5x6 1/2	H-S.	Own.	Own.	Ch.	36x6	40x6d	
Master	21	114	Bu-OU.	4 1/2 x 5 1/2	Ful.	Ful.	Ti-6460.	WO.	34x4	34x6	Sterling	OU	7 1/2	1095	Ly-CT.	3 3/4 x 5	...	...	SB.	34x4 1/2	34x4 1/2		
Master	31	114	Bu-ETU	4 1/2 x 5 1/2	Ful.	Ful.	Ti-6560.	WO.	34x4	36x8	Stewart	15	1 1/2	1495	Bu-MU.	3 3/4 x 5 1/2	...	Ful.	CL-AW.	IG.	35x5n	35x5n	
Master	51	114	Bu-YTU	4 1/2 x 6	B-L.	B-L.	Ti-6660.	WO.	36x5	40x10	Stewart	15	1 1/2	1870	Co-N.	3 3/4 x 5	...	Ful.	CL-ID.	IG.	34x3 1/2	34x6k	
Master	61	114	Bu-YTU	4 1/2 x 6	B-L.	B-L.	Ti-6760.	WO.	36x5	40x12	Stewart	7K	2 1/2	2590	Bu-HTU	4 1/2 x 5 1/2	...	Ful.	CL-2D.	IG.	34x4k	34x8k	
Master	64	5-6	Bu-ATU	4 1/2 x 6 1/2	B-L.	B-L.	Ti-6760.	WO.	36x6	40x14	Stewart	10X	3 1/2	3140	Bu-YTU	4 1/2 x 6	...	Ful.	CL-3D.	IG.	36x5	36x12	
Maxwell	1 1/2	1097	Own.	3 3/4 x 5 1/2	Own.	Own.	TI.	WO.	35x5n	35x5n	Stoughton	AS	1 1/2	2100	Wa-BUX	3 3/4 x 5 1/2	B-L.	B-L.	Cam.	Co-52000	SB.	34x4 1/2	34x4 1/2
Menominee	B	1650	Wi-SU.	3 3/4 x 5 1/2	B&B.	Det.	CS-5200.	SB.	33x5n	33x5n	Stoughton	AS	1 1/2	2100	Wa-BUX	3 3/4 x 5 1/2	B-L.	B-L.	Co-52000	SB.	34x5n	36x6n	
Menominee	HT	2000	Wi-CAU	3 3/4 x 5	Ful.	Del.	Wi-800G	WO.	34x3 1/2	36x5k	Stoughton	A	1 1/2	2150	Wa-BUX	3 3/4 x 5 1/2	B-L.	B-L.	Sh-1501.	WO.	36x3 1/2	36x5	
Menominee	H	2475	Wi-EAU	4x5	Ful.	Del.	Wi-800H	WO.	36x3 1/2	36x5k	Stoughton	B	1 1/2	2490	He-CU3.	4 1/2 x 5 1/2	B-L.	B-L.	Sh-103.	WO.	36x4	36x7	
Menominee	D-2	2875	Wi-TAU	4x6	Ful.	Del.	Wi-800J	WO.	36x4	36x8	Stoughton	D	2	3150	Hi-402.	4 1/2 x 5 1/2	B-L.	B-L.	Sh-21.	WO.	36x5	36x5d	
Menominee	J	4850	Wi-RAU	4 1/2 x 6	B&B.	Det.	Ti-6760.	WO.	36x6	40x12	Thomart	F	3	1795	Hi-400.	4 1/2 x 5 1/2	War.	War.	Es-1000.	SB.	34x5n	34x5n	
Moline	10	1695	Own.	3 1/2 x 5	B&B.	Own.	To-A.	IG.	34x5n	36x6n	Tiffin	20	1 1/2	2100	Co-C4.	4 1/2 x 5 1/2	Ful.	Ful.	Sh-103.	WO.	36x3 1/2	36x5	
Nash	2018	1595	Own.	3 1/2 x 5	B&B.	Det.	CL-ID.	IG.	34x4	34x5	Tiffin	GW	1 1/2	2700	Co-C4.	4 1/2 x 5 1/2	Ful.	Ful.	Sh-21.	WO.	36x4	36x4	
Nash	4017F	2750	Bu-HU.	4 1/2 x 5 1/2	B&B.	Own.	Own.	IG.	36x6	36x6	Tiffin	MW	2 1/2	3600	Co-L4.	4 1/2 x 5 1/2	Del.	Cot.	Sh-31.	WO.	36x5	40x5d	
Nash	3018	2150	Own.	3 3/4 x 5 1/2	B&B.	Det.	CL-2D.	IG.	34x4	34x7	Tiffin	F35	3 1/2	4300	Co-B2.	4 1/2 x 6	B&B.	Cot.	Sh-51.	WO.	36x6	40x6d	
Nash	5018	2250	Own.	3 3/4 x 5 1/2	B&B.	Det.	CL-2D.	IG.	34x4	34x7	Tiffin	TW	5-6	4500	Co-B2.	4 1/2 x 6	B&B.	Cot.	Sh-51.	WO.	36x6	40x12	
Noble	A-75	1395	Bu-WTU	3 3/4 x 5 1/2	Ful.	Ful.	CL-300.	SB.	34x4 1/2	34x4 1/2	Titan	25	2 1/2	2700	Bu-HTU	4 1/2 x 5 1/2	B&B.	Cot.	Own.	...	DR.	36x4	36x8
Noble	A-21	1890	Bu-WTU	3 3/4 x 5 1/2	Ful.	Ful.	Sh-1501.	WO.	36x4	36x7	Titan	33	3 1/2	3600	Bu-YTU	4 1/2 x 5 1/2	B&B.	Cot.	Own.	...	DR.	36x5	40x10
Noble	B-31	2390	Bu-CTU	4 1/2 x 5 1/2	Ful.	Ful.	Sh-103.	WO.	36x4	36x8	Titan	33	3 1/2	4100	Bu-YTU	4 1/2 x 5 1/2	B&B.	Cot.	Own.	...	DR.	36x5	40x12
Noble	D-51	3150	Bu-ETU	4 1/2 x 6	Ful.	Ful.	Sh-21.	WO.	36x5	36x10	Titan	33	3 1/2	4100	Bu-YTU	4 1/2 x 5 1/2	B&B.	Cot.	Own.	...	DR.	36x5	40x12
Noble	E-71	3850	Bu-YTU	4 1/2 x 6	Ful.																		



## Current Motor Truck Specifications—Continued

(This list comprises trucks distributed on a national basis)

## CANADIAN

MAKE AND MODEL	Tons Capacity	Price	ENGINE		Clutch Make	Gearset Make	REAR AXLE		TIRES		MAKE AND MODEL	Tons Capacity	Price	ENGINE		Clutch Make	Gearset Make	REAR AXLE		TIRES	
			Make & Model	Bore & Stroke			Make & Model	Final Drive	Front	Rear				Make & Model	Bore & Stroke			Make & Model	Final Drive	Front	Rear
Gottfredson...20	1/2-1	\$2275	Bu-WTU	3 3/4x5 1/2	B-L.	B-L.	Ti-6250.	W.O.	34x5n	34x5n	National...FA	1	\$2450	Wa-BUX	3 3/4x5 1/2	B-L.	B-L.	Ti-6352.	W.O.	35x5n	35x5n
Gottfredson...40	1 1/2-2	3290	Bu-GTU	4 1/2x6 1/2	B-L.	B-L.	Ti-6460.	W.O.	36x6n	36x7n	National...GA	1 1/2	2750	Wa-BUX	3 3/4x5 1/2	B-L.	B-L.	Ti-6460.	W.O.	34x4k	34x6k
Gottfredson...50	2 1/2-3	3775	Bu-ETU	4 1/2x6 1/2	B-L.	B-L.	Ti-6560.	W.O.	36x4	36x8	National...HD	2 1/2	3750	Wa-CU	4 1/2x6 1/2	H.S.	B-L.	Ti-6560.	W.O.	36x5	36x10
Gottfredson...80	4	4775	Bu-YTU	4 1/2x6 1/2	B-L.	B-L.	Ti-6666.	W.O.	34x5	36x12	National...NB	3 1/2	4750	Wa-DU	4 1/2x6 1/2	H.S.	B-L.	Ti-6666.	W.O.	36x6	36x12
Gottfredson...100	5	5800	Bu-BTU	5 1/2x6 1/2	B-L.	B-L.	Ti-6760.	W.O.	36x6	40x14	National...OA	5	6150	Wa-EU	5 1/2x6 1/2	H.S.	B-L.	Ti-6760.	W.O.	36x6	40x14
Mapleleaf...11 1/2	1 1/2	3000	Hi-300	3 3/4x5 1/2	Ful.	Ful.	Sh-1501.	W.O.	34x5n	36x6n	Veteran...M	1 1/2	2899	Bu-CTU	3 3/4x5 1/2	B&B.	Cot.	Sh-1501.	W.O.	34x5n	34x5n
Mapleleaf...AA	2	3600	Hi-400	4 1/2x5 1/2	Ful.	Ful.	Sh-210.	W.O.	36x4	36x7	Veteran...P	2	3699	Bu-HTU	4 1/2x5 1/2	B&B.	Cot.	Sh-210.	W.O.	36x4	36x7
Mapleleaf...BB	3	4050	Hi-500	4 1/2x5 1/2	Ful.	Ful.	Sh-31.	W.O.	36x4	36x4d	Veteran...R	3	4200	Bu-HTU	4 1/2x5 1/2	B&B.	Cot.	Sh-31.	W.O.	36x4	36x7
Mapleleaf...CC	4	4800	Hi-600	4 1/2x5 1/2	Ful.	Ful.	Sh-31.	W.O.	36x5	36x5d	Veteran...S	4	5395	Bu-YTU	4 1/2x6	B&B.	Cot.	Sh-31.	W.O.	36x5	36x10
Mapleleaf...DD	5	5625	Hi-1600	4 1/2x5 1/2	Ful.	Ful.	Sh-51.	W.O.	36x6	36x6d											

## Current Tractor Specifications

MAKE & MODEL	Drawbar-Pulling Rating	Recommended No. of 14 Ins. Plovs	Price	ENGINE				MAKE & MODEL	Drawbar-Pulling Rating	Recommended No. of 14 Ins. Plovs	Price	ENGINE				MAKE & MODEL	Drawbar-Pulling Rating	Recommended No. of 14 Ins. Plovs	Price	ENGINE					
				Make	No. of Cyls Bore & Stroke	Weight (Lbs.)	Traction Members, Diameter & Face (Ins.)					Make	No. of Cyls Bore & Stroke	Weight (Lbs.)	Traction Members, Diameter & Face (Ins.)					Make	No. of Cyls Bore & Stroke	Weight (Lbs.)	Traction Members, Diameter & Face (Ins.)		
Allis-Chalmers...	6-12	1	\$325	LeR.	4-3 1/2x4 1/2	2500	48x 6	Gray...	EU	22-40	4	2385	Wau.	4-5 x6 1/2	6900	†	Rumely OilPull..E	30-60	8-10	...	Own.	2-10x12	26000	80x30	
Allis-Chalmers...	15-25	3	1285	Mid.	4-4 1/2x5 1/2	4700	46x12	Hart-Parr...	20	-20	2	...	Own.	2-5 1/2x6 1/2	4250	46x10	Russell...	15-30	3-4	...	Cli...	4-5 x6 1/2	6900	56x14	
Allis-Chalmers...	20-35	4	1885	Own.	4-4 1/2x6 1/2	6150	50x12	Hart-Parr...	30	-30	3	...	Own.	2-6 1/2x7	5220	52x10	Russell...	20-40	4-5	...	Cli...	4-5 1/2x7	7900	60x16	
Allwork...	D 20-38	4-5	1695	Own.	4-5 x7	6500	48x14	Hart-Parr...	(Road)	-30	3	...	Own.	2-6 1/2x7	7560	52x18	Russell...	30-60	8-10	...	Own.	4-8 x10	22550	84x22	
Allwork...	C 14-28	3	1495	Own.	4-4 1/2x6	4800	48x12	Hart-Parr...	40	-40	4	...	Own.	4-6 1/2x6 1/2	7510	32x18	Shaw-Enechs (Gr.)	...	...	...	LeR.	4-3 1/2x4 1/2	4400	48x 8	
Allwork...	C 16-30	3	1295	Own.	4-5 x6	5200	48x12	Heider...	D	9-16	2	...	Wau.	4-4 1/2x6 1/2	4000	54x 8	Topp-Stewart...	B 30-45	4	...	Wau.	4-4 1/2x6 1/2	7800	42x12	
Aultman-Taylor...	15-30	3-4	1900	Cli...	4-5 x6 1/2	7800	70x12	Heider...	C	12-20	3	...	Wau.	4-4 1/2x6 1/2	6000	57x10	Toro...	6-10	2	\$675	LeR.	4-3 1/2x4 1/2	2900	41x 9	
Aultman-Taylor...	22-45	4-6	3100	Own.	4-5 1/2x6 1/2	12500	70x20	Heider...	M-2	5-10	...	LeR.	4-3 1/2x6 1/2	2800	46x 6	Townsend...	10-20	2-3	800	Own.	2-6 1/2x7	4500	48x12		
Aultman-Taylor...	30-60	8-10	4400	Own.	4-7 x9	22500	90x24	Huber... (Light 4)	12-25	3	985	Wau.	4-4 1/2x6 1/2	5000	60x10	Townsend...	15-30	3-4	1350	Own.	2-7 x8	6500	56x18		
Avery...	15	3-4	...	Own.	4-4 1/2x6	4750	50x12	Huber... (Super 4)	15-30	3	...	Mid.	4-4 1/2x6	6000	60x10	Townsend...	25-50	4-8	2250	Own.	2-8 1/2x10	11500	60x24		
Avery...	20-35	4-5	...	Own.	4-4 1/2x7	7500	60x16	Lauson...	S	12-25	3	...	Mid.	4-4 1/2x6 1/2	4200	...	Traylor...	6-12	1	500	LeR.	4-3 1/2x4 1/2	1750	38x10	
Avery...	25-50	5-6	...	Own.	4-6 1/2x7	12500	69x20	Lauson...	T	15-30	4	...	Bea.	4-4 1/2x6	6200	...	Twin City...	12-20	3	1200	Own.	4-4 1/2x6	4700	50x12	
Avery...	45-65	8-10	...	Own.	4-7 1/2x8	22000	87 1/2x24	Leader...	B	12-18	2	375	Own.	4-6 1/2x6	4800	50x12	Twin City...	20-35	5	2750	Own.	4-5 1/2x6 1/2	8400	60x20	
Avery...Tr. Runner	3	...	...	Own.	4-4 x5 1/2	5000	x 8 1/2	Leader...	N	16-32	3-4	1275	Cli...	4-5 x6	5800	52x12	Twin City...	40-65	8	4750	Own.	4-7 1/2x9	23700	84x24	
Avery...Road Racer	...	...	...	Own.	6-3 x4	4600	42x 6	Lincoln...	A	15-30	3	1600	Bud.	4-4 1/2x6	5000	40x14	Uncle Sam...C-20	12-20	2-3	...	Her...	4-4 x5	3000	46x12	
Bates (St. Mule) H	15-25	3	...	Mid.	4-4 1/2x5 1/2	3600	48x10	Little Giant...	B	16-22	4	...	Own.	4-4 1/2x5	5200	54x14	Uncle Sam...B-19	20-30	3-4	...	Bea...	4-4 1/2x6	4650	50x12	
Bates (St. Mule) F	18-25	3	...	Mid.	4-4 1/2x5 1/2	4850	56x10	Little Giant...	A	26-35	6	...	Own.	4-5 1/2x6	8700	66x20	Uncle Sam...D-21	20-30	3-4	...	Bea...	4-4 1/2x6	4600	50x12	
Bates (St. Mule) G	25-35	4	...	Mid.	4-4 1/2x6	6500	56x10	Lombard...	100	12-16	...	...	Own.	6-5 1/2x7	19000	x12	Wallis...	OK	15-27	3	...	Own.	4-4 1/2x5 1/2	3660	48x12
Bates (St. Mule) 40	30-40	...	...	Mid.	4-4 1/2x6	8500	58x12	London...	12-25	3	...	Mid.	4-4 1/2x6 1/2	48x12	...	Waterloo Boy...N	12-25	3	...	Own.	2-6 1/2x7	5860	52x12		
Best...	B-25	3-4	4250	Ste...	4-4 1/2x6 1/2	6000	64x12	McCork-Deering	10-20	2	850	Own.	4-4 1/2x5	3700	42x12	Wisconsin...	16-30	3-4	1750	Cli...	4-5 x6 1/2	5600	52x12		
Best...	30-40	4	...	Own.	4-4 1/2x6 1/2	8100	68x11 1/2	McCork-Deering	15-30	3	1250	Own.	4-4 1/2x6	5750	50x12	Wisconsin...	22-40	4-5	2550	Cli...	4-5 1/2x7	7500	52x12		
Best...	40-60	6	...	Own.	4-6 1/2x8	18580	89x20	Minneapolis...	12-25	3	...	Own.	4-4 1/2x7	6600	50x12	Yuba (Ball Tread)	15-25	4	2750	Wis.	4-4 1/2x6	5750	53x12		
Best...	60-80	9	...	Own.	4-6 1/2x8	18580	89x20	Minneapolis...	17-30	3-4	...	Own.	4-4 1/2x7	6400	54x12	Yuba (Ball Tread)	25-40	8	4500	Own.	4-5 1/2x7	10130	*48x17 1/2		
Bryan...	Steam 15-30	3	2385	Own.	2-4 x5	5500	53x12	Minneapolis...	22-44	4-5	...	Own.	4-7 1/2x9	22500	85x30										
Case...	12-20	3	895	Own.	4-4 1/2x5	4230	42x12	Moline (Un.)...	D	9-18	2-3	725	Own.	4-3 1/2x5	3340	44x 8									
Case...	15-27	3-4	1350	Own.	4-4 1/2x6	6600	52x14	Moline (Orc.)...	D	9-18	2-3	725	Own.	4-3 1/2x5	3340	44x 8									
Case...	22-40	4-5	2650	Own.	4-5 1/2x6 1/2	10700	56x16	Monarch...	C	20-30	4	3800	Bea.	4-4 1/2x6	8700	*66x12									
Case...	40-72	8-10	4900	Own.	4-7 x8	21200	72x20	Monarch...	E	25-40	...	5000	Bea.	4-4 1/2x6	12000	*67x12									
Caterpillar...2 Ton	15	3	...	Own.	4-4 x5 1/2	4000	...	Monarch...	D	35-60	...	6000	Bea.	6-4 1/2x6	15000	*89x12									
Caterpillar...5 Ton	25	4	...	Own.	4-4 1/2x6	9400	...	Nichols-Shepard	20-42	4-6	2800	Own.	2-8x10	13500	64x20										
Caterpillar...10 Ton	40	6	...	Own.	4-6 1/2x7	20000	...	Nichols-Shepard	25-50	6-8	3320	Own.	2-9x12	20500	69x28										
Cletrac...	F 9-16	2	845	Own.	4-3 1/2x4 1/2	1930	*42x 5 1/2	Nichols-Shepard	35-70	8-12	4030	Own.	2-10x14	30000	73x32										
Cletrac...	W 12-20	2	1345	Own.	4-4 x5 1/2	3455	*48x 8	Pioneer...	G	18-36	4	...	Own.	4-5 1/2x6	6500	60x18									
Eagle...	F 12-22	3	...	Own.	2-7 x8	5850	48x12	Pioneer...	C	40-75	10	...	Own.	4-7 x8	24000	96x24									
Eagle...	H 16-30	4	...	Own.	2-8 x8	7100	48x12	Rumely OilPull..K	12-20	3	...	Own.	2-6 x8	6638	51x12										
E-B...	AA 12-20	3	...	Own.	4-4 1/2x5	4550	54x12	Rumely OilPull..H	16-30	4	...	Own.	2-7 x8 1/2	9506	56x16										
E-B...	Q 12-20	3	...	Own.	4-4 1/2x5	9500	60x12	Rumely OilPull..G	20-40	6	...	Own.	2-8 x10	12968	64x20										
E-B...	16-32	4	...	Own.	4-5 1/2x7	9400	72x16																		
Fageol...	19-12	2	1200	Lyc...	4-3 1/2x5	3600	48x 8 1/2																		
Fordson...	18	2	420	Own.	4-4 x5	2562	42x12																		
Frick...	A 12-20	2	1000	Erd...	4-4 x6	5800	60x10																		
Frick...	C 15-28	3	1600	Bea...	4-4 1/2x6	6730	60x12																		

B&S—Briggs & Stratton  
 Ben—Beaver  
 Bud—Buda

Lyc—Lycoring  
 Mid—Midwest  
 N-W—New Way

Ste—Stearns  
 Wau—Waukesha  
 Wei—Weideley</

# Current Passenger Car Specifications

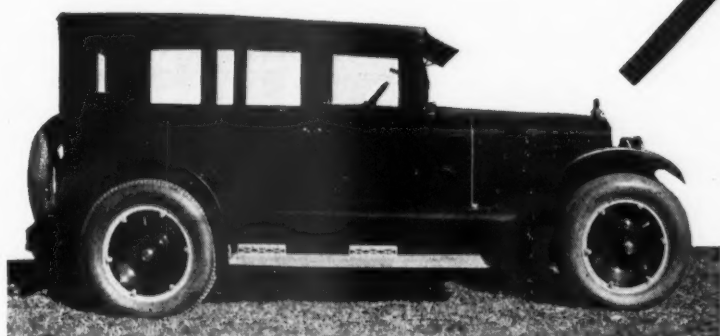
(This list comprises cars distributed on a national basis)

PRICES						Wheel Base (Ins.)	Tire Size (Ins.)	NAME AND MODEL	ENGINE			ELECTRICAL SYSTEM		Clutch: Type and Make	Gearset Make	Universal: Type and Make	REAR AXLE		BRAKES: Service and Emergency		
OPEN MODELS			CLOSED MODELS						Make and Model	No. of Cyls. Bore and Stroke	Horse Power Rating (N.A.A.C.)	Carburetor Make	Generator and Starter Make				Ignition Make	Type and Make		Gear Ratio	
2-3 Pass.	4-5 Pass.	6-7 Pass.	Sport Models	2-3 Pass. Maximum	4-5 Pass.	6-7 Pass.															
\$1950e	\$1785	\$1850	\$1885c	\$2250	\$2485		127	33x4 1/2	American.....D-66	H-S..11000	6-3 1/2x5	29.40	Strom.	G-D..	A-K..	s-p B&B.	B & B..	m Hart	F Salis	4.50	R-L-R
	1195		1445c	1425	1495	d1895p	115	32x4	*1Anderson.....41	Cont...7 U	6-3 1/2x4 1/2	23.44	Zenith..	West..	s-p B&B.	Durston.	f Univ.	1/2 F Salis	4.75	R-L-T	
		1595			1695		122	32x4 1/2	*1Anderson.....50	Cont...8 R	6-3 1/2x4 1/2	27.34	Zenith..	Remy..	Remy..	s-p B&B.	Durston.	f Univ.	3/4 F Salis	1.50	R-L-T
	1535				2200		120	32x4	Apperson.....6	Falls.....	6-3 1/2x4 1/2	23.44	Strom.	Remy..	Remy..	s-p Rock..	Mech..	m Thie..	1/2 F Col.	5.10	R-L-R
	2800	2800			3750	\$3750	130	33x5	Apperson.....8-23-S	Own.....	8-3 1/2x5	33.80	Johnson.	Bijur..	Remy..	m-d Own.	Own..	m Thie..	1/2 F Own	4.25	R-L-R
	1095		1325d	1495d	1595		114	31x4	Auburn.....6-43	Cont...7 U	6-3 1/2x4 1/2	23.44	Strom.	Remy..	Remy..	s-p B&B.	Warner.	m Univ.	1/2 F Col.	4.63	R-L-T
	1595		1850d		2145	2345	124	32x4 1/2	Auburn.....6-63	Own.....	6-3 1/2x5	25.35	Strom.	Remy..	Remy..	s-p B&B.	Warner.	m Thie..	1/2 F Col.	4.63	R-L-T
	1395		1495d	1685d	1850		118	32x4	Barley.....6-50	Cont...7 U	6-3 1/2x4 1/2	23.44	Strom.	Delco.	Delco.	s-p B&B.	Fuller..	f M&E.	3/4 F Col.	5.10	R-L-R
				12250p																	
	935	965		800g	1395c	1495	109	31x4	Buick.....1924	Own.....	4-3 3/4x4 1/2	18.23	Marvel.	Delco.	Delco.	m-d Own.	Own..	m Own.	3/4 F Own	4.66	FL-R
	1275	1295		1135g	1995c	1695	120	32x4	Buick.....1924	Own.....	4-3 3/4x4 1/2	27.34	Marvel.	Delco.	Delco.	m-d Own.	Own..	m Own.	3/4 F Own	4.10	FL-R
					2095																
	1385g		1565	1675a		2235f	128	32x4 1/2	Buick.....1924	Own.....	6-3 1/2x4 1/2	27.34	Marvel.	Delco.	Delco.	m-d Own.	Own..	m Own.	F Own	4.70	FL-R
			1725d																		
	2985	2985	2985		3875	4250	132	33x5	Cadillac.....V 63	Own.....	8-3 1/2x5 1/2	31.25	Own..	Delco.	Delco.	m-d Own.	Own..	m Spicer	F Tim	Opt.	FL-R
					4150	4600g	122	32x4 1/2	Case.....X	Cont...8 R	6-3 1/2x4 1/2	27.34	Schebler.	Delco.	Delco.	m-d Own.	Own..	f Sneed.	1/2 F Col.	4.90	R-L-R
	1750	1790		2230d	2480c	2675	132	33x5	Case.....Y	Cont...6 T	6-3 1/2x5 1/2	31.54	Rayfield.	Delco.	Delco.	m-d Own.	Own..	f Sneed.	3/4 F Col.	4.70	R-L-R
		1185		1335d		1535	117	32x4	*1Chalmers.....1923	Own.....	6-3 1/2x4 1/2	25.35	Strom.	A-L..	A-L..	m-d Own.	Own..	m Mech.	1/2 F Tim	5.13	R-L-R
			1295			2095	122	32x4	*1Chalmers.....1923	Own.....	6-3 1/2x4 1/2	25.35	Strom.	A-L..	A-L..	m-d Own.	Own..	m Mech.	1/2 F Tim	5.13	R-L-R
	1595	1485	1635	1785c		1785	123	32x4	Chandler.....Six	Own.....	6-3 1/2x5	29.40	Strom.	Bosch.	Bosch.	s-p B&B.	Own..	Own..	F Own	4.45	R-L-T
		1685				2270															
	490	495	395g		640	795	103	30x3 1/2	Chevrolet...Superior	Own.....	4-3 1 1/4x4	21.76	Zenith..	Remy..	Remy..	c Own..	Own..	m Own.	1/2 F Own	3.77	R-L-R
	1085	1045		1145d	1245	1365	112 1/2	31x4	Cleveland.....42	Own.....	6-3 1 1/4x4 1/2	22.50	Strom.	Bosch.	Bosch.	s-p B&B.	Own..	m Mech.	1/2 F Own	4.90	R-L-T
				1295d	1345	1445d															
	2175	2175	2175	2475	2750c	3075	127 1/2	33x5	Cole.....Master	Nort.M311	8-3 1/2x4 1/2	39.20	Johnson.	Delco.	Delco.	m-d Nort.	Nort..	m Spicer	F Col.	4.70	R-L-R
								34x7d													
	1475	995		1195d	1395	1495	115	32x4	Columbia...Big Six	Cont...8 R	6-3 1/2x4 1/2	27.34	Strom.	A-L..	A-K..	s-p B&B.	Durston.	m Spicer	1/2 F Tim	4.75	R-L-R
		1295			1495	1650d	116	31x4	Columbia...Light Six	Cont...6 Y	6-3 1/2x4 1/2	23.44	Strom.	A-L..	A-L..	s-p B&B.	Durston.	m Spicer	1/2 F Tim	5.10	R-L-T
	1395p	1295		1505c	1495	2195p	110	32x4	Courier.....	Falls. 8000	6-3 1/2x4 1/2	23.44	Strom.	West..	A-K..	s-p B&B.	Muncie..	f Flex.	3/4 F Col.	5.10	R-L-R
		3100	3100			4500	138	33x4 1/2	Crawford...23-6-70	Cont...6 T	6-3 1/2x5 1/2	31.54	Zenith..	West..	Bosch.	m-d B-L.	B-L..	m Spicer	1/2 F Tim		R-L-R
			3500c		4500		138	33x5	Crawford-Dagmar.6-70	Cont...6 T	6-3 1/2x5 1/2	31.54	Zenith..	West..	Bosch.	m-d B-L.	B-L..	m Spicer	1/2 F Tim		R-L-R
	5800	6300		7650			142	33x5	Cunningham...V4	Own.....	8-3 1/2x5	45.00	Strom.	Delco.	Delco.	m-d Own.	Own..	f Sneed.	F Tim	4.23	R-L-R
	5000	4650	4700	4650c	6350	6450	132	33x5	Daniels.....23-38	Own.....	8-3 1/2x5 1/2	39.20	Zenith..	Delco.	Delco.	m-d Own.	Own..	m Spicer	F Tim	4.23	R-L-R
			4800		5600																
	1295	5000	5150		6000c	6800	138	33x5	Daniels.....23-38	Own.....	8-3 1/2x5 1/2	39.20	Zenith..	Delco.	Delco.	m-d Own.	Own..	m Spicer	F Tim	4.23	R-L-R
	1495			1495c	1595	1795c	115	31x4	Davis.....71	Cont...7 U	6-3 1/2x4 1/2	23.44	Strom.	Delco.	Delco.	s-p B&B.	Warner.	m Peters	1/2 F Tim	5.10	R-L-R
	850	880		730g	1035	116	32x4	Dodge Brothers.....	Own.....	4-3 1/2x4 1/2	24.03	Stewart.	N.E..	N.E..	m-d Own.	Own..	m Own.	1/2 F Own	4.54	R-L-R	
					1385																
		3950	3950	4150c	4985c	5800	136	32x6	Dorris.....6-80	Own.....	6-4 x5	38.40	Strom.	West..	Bosch.	m-d Own.	B-L..	m Spicer	1/2 F Tim	3.77	R-L-R
		1095		1245c	1535d	d1535f	115	31x4	Dort.....27	Falls.T8000	6-3 1/2x4 1/2	23.44	Carter..	Bosch.	Bosch.	m-d Det..	Own..	m Ther.	3/4 F Fl.	4.66	R-L-R
	6500	6250	6750	6500c	7800c	7800	134	33x5	Duesenberg.Straight 8	Own.....	8-2 1/2x5	26.45	Strom.	Delco.	Delco.	s-p Own.	Own..	f Chi..	1/2 F Own	4.45	FL-R
	830	850		1063d	1365	1465	109	31x4	Durant.....A-22	Cont...Spec	4-3 1/2x4 1/2	24.03	Tillotson	A-L..	A-L..	s-p Own.	Warner.	m Spicer	1/2 F Ad..	4.33	R-L-R
					1740																
	1485	1095		1275d	1395c	1595	112	32x4	Earl.....40	Own.....	4-3 1/2x5 1/2	18.91	Scoc..	A-L..	Conn..	s-p B&B.	Own..	f Own.	1/2 F Own	4.87	R-L-T
		995		1195d		1265f	112	31x4	Elcar.....4-40	Own.....	4-3 1/2x5	21.03	Strom.	Delco.	Delco.	s-p B&B.	Warner.	m Peters	3/4 F Salis	4.50	R-L-R
		1395		1595d	1995	p2195d	118	32x4	Elcar.....6-60	Cont...8 R	6-3 1/2x4 1/2	27.34	Strom.	Delco.	Delco.	s-p B&B.	Warner.	m Spicer	3/4 F Salis	4.50	R-L-R
		1895			2145	2345	118	32x4 1/2	Elgin.....	Falls-Spec	6-3 1/2x4 1/2	23.44	Strom.	DeJon..	DeJon..	s-p B&B.	Warner.	f..	1/2 F Col.	4.33	FL-T
		850			975		110 1/2	31x3 1/2	Essex.....	Own.....	6-2 1/2x4	16.54	Own..	Bosch.	Bosch.	m-d Own.	Own..	m Spicer	1/2 F Own	5.40	R-L-R
	1195	1195		1195	1895c	1985	120	32x4 1/2	Flint.....	Cont...Spec	6-3 1/2x5	27.34	Strom.	DeJon..	DeJon..	s-p Own.	Warner.	m Spicer	1/2 F Ad..		R-L-R
	265r	295s	230g		525	685	100	30x3 1/2	Ford.....T	Own.....	4-3 1/2x4	22.50	Own..	Own..	Own..	s-p Own.	Own..	m Own.	1/2 F Own	3.63	T-R
					590d																
	2975	2975		3975	3975		132	32x4 1/2	Fox.....Air-Cooled	Own.....	6-3 1/2x5	27.34	Zenith..	West..	Scintilla	m-d B-L.	B-L..	m Spicer	1/2 F Tim	4.90	R-L-R
		1950		12750c	2250	\$2950d	115	32x4 1/2	Franklin.....10-B	Own.....	6-3 1/2x4	25.35	Own..	A.K..	A-K..	s-p M&E.	Own..	m Spicer	1/2 F Own	4.73	T-R
				12850																	
	995	995	1095d	1155c	1445	\$1335d	112	32x4	Gardner.....Series 5	Lye...Spec	4-3 1 1/2x5	21.76	Zenith..	West..	West..	s-p B&B.	Mech..	m Peters	3/4 F Fl.	4.80	R-L-T
	510	520		625d	835		100	30x3 1/2	Gray.....	Own.....	4-3 1/2x4	21.03	Scoc..	West..	West..	s-p Own.	Own..	m Mech.	1/2 F Tim	3.90	R-L-T
	2250	2250					120	32x4 1/2	H.C.S.....Series 4	Weid.....	4-3 1/2x5 1/2	22.50	Strom.	Delco.	Delco.	m-d B-L.	B-L..	m Spicer	3/4 F Own	4.63	R-L-R
		2650			3350		126	32x4 1/2	H.C.S.....Series 6	Own.....	6-3 1/2x5	29.40	Strom.	Delco.	Delco.	m-d B-L					



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*The Coachbuilt*  
**ANDERSON**  
ALUMINUM SIX

## Current Passenger Car Specifications

(This list comprises cars distributed on a national basis)

PRICES							Wheel Base (Ins.)	Tire Size (Ins.)†	NAME AND MODEL	ENGINE				ELECTRICAL SYSTEM		Clutch: Type and Make	Gearset Make	Universal: Type and Make	REAR AXLE		BRAKES: Service and Emergency
OPEN MODELS			Sport Models	CLOSED MODELS						Make and Model	No. of Cyls. Bore and Stroke	Horse Power Rating (N.A.A.C.)	Carburetor Make	Generator and Starter Make	Ignition Make				Type and Make	Gear Ratio	
2-3 Pass.	4-5 Pass.	6-7 Pass.		2-3 Pass.	4-5 Pass.	6-7 Pass.	LaFayette Lexington.....23	Own.....M	8-3½x5½ 6-3½x4½							33.80 26.30	Johnson Rayfield.	Delco G-D.			Delco Conn.
5000 1795 3800	5000 1795 3800	5000 1795 3800	4200g 2145d 2345f 4600c	6300 2345 2645 4400 4700 5100s 11750 11600 12200 12200	6500 2345 2645 4400 4700 5100s 11750 11600 12200 12200	132 123 136 142 136	33x5 33x5 33x5 35x5 32x4½	Lincoln	Own.....	8-33x5½	36.45	Strom.....	Delco	Delco	m-d Own.	Own.....	m Spicer	F Tim	4.58	R-L-R	
8990 2300g 795	7900 2785 795	7900 2785 795	2985a 2985e 895b 975d	3585 3985 1195 1295 3000 6000c 6810 6900s	4285½ 3985 1195 1045d 3000 6000c 6810 6900s	142 136 109 127 140	35x5 32x4½ 31x4 32x4½ 33x5	*2Locomobile Series 8 *3Marmon.....34 Maxwell	Own..... Own..... Own.....	6-41x5½ 6-33x5½ 4-35x4½	48.60 33.75 21.03	Ball&B. Strom. Stewart.	West. Delco Remy.	Delco	m-d Own.	Own.....	m Own. f Own.	F Own ½F Own	3.85 4.10 4.60	R-L-R R-L-T	
2500 5400	2500 5600	5700	3000 6720	3000 6600c 6810 6900s	3000 6600c 6810 6900s	127 140	32x4½ 33x5	McFarlan *4McFarlan.....1923	Own.....	6-33x5 6-41x6	27.34 48.60	Rayfield. Rayfield.	Delco West.	Delco West.	m-d	.....	.....	½F	.....	R-L-T R-L-R	
3950b 1295	3750c 1295	3950c 3750c 1495d	3950c 3750c 1495d	3950c 3750c 1495d	3950c 3750c 1495d	132 132 115	32x4½ 32x4½ 31x4 30x5 32x4½ 32x6	Mercer.....Series 5 Mercer Moon.....U6-40 Moon.....6-58	Own..... Own..... Cont.....7 U Cont.....8 R	4-33x6½ 6-33x5 6-33x4½ 6-33x4½	22.50 33.75 23.41	Ball&B. Strom.	West. Delco	Eisem. Delco	m-d Own. m-d Own.	Own.....	m Spicer m Spicer	F Own ½F Tim	3.87 3.77 5.10	T-L-R T-L-R R-L-T	
1240 915	1310 935	1050g 1390	1645c 1195d	2090c 2090 1890 1445	2040 2040 1910 1445	121 121 112	33x4 31x4½ 33x4	Nash.....691-3-6-7 Nash.....692-4-5-8 Nash.....41-8	Own..... Own..... Own.....	6-31x4½ 6-31x4½ 4-35x5	25.35 25.35 18.23	Marvel. Marvel. Marvel.	Delco Delco	Delco	s-p B&B. s-p B&B.	Own..... Own.....	m Own. m Own.	½F Own ½F Own	4.50 4.90 4.88	R-L-T R-L-T R-L-T	
2175 2500	2475c 2500c	2475c 2600c	2485d 3150	3250 3725 3500	3285 3725 3500	130 128	32x4½ 33x5	National.....BB Noma.....4C	Own..... Cont.....8 R	6-31x5½ 6-33x4½	29.40 27.34	Rayfield. Zenith.	West. Delco	Delco	s-p B&B. s-p B&B.	B-L	m Univ.	F Col.	4.08	R-L-R	
945 750 495 695	915 750 495 695	.....	1095a 1095d 885d 395g	1195 1395 1035 1095 750 795	1345 1395 1035 1095 795 795	113 110 106	31x1 31x4 30x3½ 30x3½	Oakland.....6-54 Oldsmobile.....30 Overland.....91 Overland.....92	Own..... Own..... Own.....	6-21½x4½ 6-2½x4½ 4-31x4 4-31x4	18.90 18.15 19.60 19.60	Strom. Zenith.	Remy. Delco	Remy. Delco	s-p Hoos. s-p B&B.	Muncie. Muncie.	m Mech. f Own.	½F Own ½F Own	4.70 5.10	F-L-T R-L-T	
2185 3850c	2485 3650	2250g 2085 3850 2450	2650c 2350g 4550c	3175c 3275 3525f 4900f 3235 2850 3345½	3350d 3575g 4950f 3235 3345½	126 133 136 131	33x4½ 33x4½ 33x4½ 33x4½	Packard.....126 Packard.....133 Packard "Eight".....136 Packard "Eight".....143 Paige.....6-70	Own..... Own..... Own..... Cont.....9 A	6-33x5 6-33x5 8-33x5 6-33x5	27.34 27.34 36.45 33.75	Own. Own. Own. Rayfield	A-K. A-K. Dyneto A-K.	Delco Delco	m-d Own. m-d Own.	Own.....	m Spicer m Spicer	½F Own ½F Own	4.66 4.66 4.70 4.90	R-L-R R-L-R R-L-R R-L-R	
1550 2535	1390 2535	1425 2585d	1465d 2635d	2395d 3000d 3050 1875 d2235f 1985 4000	2395 3390 3840 4090s 3235 3345½	120 128	32x4½ 33x5	Paterson.....23-6-52 Peerless.....66	Cont.....8 R Own.....	6-33x4½ 8-31x5	27.34 33.80	Strom. Ball&B.	Delco Delco	Delco	s-p B&B. m-d Own.	Durston. Own.	m Hart. m Spicer	½F Salis ½F Tim	4.50 4.90	R-L-R R-L-R	
5250 2535	5250 2535	5250 2585d	.....	6800 6900 7000	6800 7000	138	33x5	Pierce-Arrow.....	Own.....	6-4 x5½	38.40	Own.....	Delco	Delco	m-d Own.	Own.....	m Spicer	½F Own	4.29	R-L-R	
..... 2535	1695 2535	1745 2585d	1745 2635d	2445 2495f 3385 3585	2495f 3385 3585	126 126½	32x4½ 32x4½	Pilot.....6-56 Premier.....6-D	H-S.....90 Own.....	6-31x5 6-33x5½	25.35 27.34	Tillotson Strom.	Wagner Delco	Wagner Delco	s-p Hoos. s-p B&B.	Muncie. Own.	m Blood. m Spicer	½F Col. ½F Tim	4.67 4.58	R-L-R R-L-R	
..... 3200c	2300 1835	2350 2100c 1545d	3000d 1545d	3050 1875 d2235f 1985 4000	3050 1875 d2235f 1985 4000	124 120	32x4½ 32x4	R & V Knight.....H Reo.....76	Own. Kn'gt Own.....	6-31x4½ 6-31x5	29.40 24.34	Strom. Rayfield.	A-L..... N.E.	A-L..... N.E.	s-p B-L. m-d Own.	B-L. Own.	m Spicer m Own.	½F Tim ½F Own	4.70 5.10	R-L-R R-L-R	
..... 3200c	3200 3200c	3200c	3200c	.....	.....	131	32x4½	Revere.....M	Dues.....4 Monson.....4 Own..... Cont.12XD	4-41x6 4-49x6 6-31x4½ 6-33x5½	28.90 30.63 23.44 29.40	Strom. Strom.	West. Bosch.	Bosch. Bosch.	m-d B-L. s-p Own.	B-L. Warner.	m Spicer m Mech.	½F Std ½F Col.	3.44 5.10	R-L-R R-L-T	
1685a 2685	1485 2485	2685 2750c	1885e 3285	1985 3585 3585d 4000f 4250p 3950 4650p	1985 3585 3585d 4000f 4250p 3950 4650p	117 128	32x4 32x4½	*4Rickenbacker.....B Roamer.....6-54-E Roamer.....4-75-E	Own..... Cont.12XD Own.....	6-31x4½ 6-33x5½ 4-41x6	23.44 29.40 28.90	Strom. Strom.	Bosch. West.	Bosch. Split.	s-p Own. s-p B&B.	Warner. G-L	f Sneed f Sneed	½F Col. ½F Tim	5.10 4.08	R-L-T R-L-R	
3685 3785	3485 975	3800 11450	3650c 1175	4650p 12800 13500 5100 5200 5250	4650p 12800 13500 5100 5200 5250	138 112	32x4½ 32x4½	Rollin.....31x5¼ Rolls-Royce.....40-50 Rubay.....	Own..... Own..... Own.....	4-31x4½ 6-41x6 4-29x5½	16.90 48.60 12.10	Tillotson Own.	Dyneto Bijur.	Conn. Bosch.	s-p B-L. s-p Own.	Muncie. Own.	f Sneed. m Own.	½F Salis F Own	5.10 3.72	F-L-T R-L-R	
1615 875 985	1645 875 985	.....	2645d	2615	118 108 112	33x4 30x3½ 31x4	.....	Sayers Six.....DP Seneca.....L-2 & O-2 Seneca.....50c & 51c	Cont.....8 R l.y.c.....KB l.y.c.....KB	6-33x4½ 4-31x5 4-33x5	27.34 19.60 21.03	Strom. Zenith. Zenith.	Delco A-L..... A-L.....	Delco A-L.....	s-p B&B. s-p B&B. s-p B&B.	G-L G-L G-L	m Arvac. m Univ. m Univ.	½F Std. F Peru F Peru	4.75 4.75 4.50	R-L-R R-L-R R-L-R	
2750 490 1750c 2395	2750 490 1750 2395	2750 1445g 2495	2425g 640d 2195g	3585 640 2350 339p 3950 3395 3395	3985 p935d 2195f 3395 3395	130 102 125 130	32x4½ 30x3½ 31x4½ 34x4½	Stanley.....740 Star..... Stearns-Knight. SKL4 Stearns-Knight.....6	Own..... Cont. Spec Own. Kn'gt Own. Kn'gt	2-4 x5 4-31x4½ 4-33x5½ 6-33x5	13.00 15.63 22.50 27.34	None..... Tillotson Schebler. West.	Bijur. A-L..... A-L..... A-K.	None..... A-L..... A-K.	None..... s-p Own. m-d Own.	None..... Warner. Own.	None..... f Cli.	None..... m Spicer f Cli.	½F Own ½F Tim ½F Own	1.50 4.87 4.50 4.70	R-L-R R-L-R R-L-R R-L-R
1295 1750 1985 975 1325 1450g	1295 1750 1985 975 1325 1450g	1295 1595 1850c 2200c 845g 1100g 1895d 1835d	1595d 1995 2200c 1195 1485 1395d 1100g 1895d 2495	1995 2250 d2750p 125 31x4 32x4 32x4½	1995 2250 d2750p 125 31x4 32x4 32x4½	117 124 112 119	32x4 32x4½ 32x4½ 32x4½	Stephens.....10 Stephens.....20 Sterling-Knight Studebaker.....Light Six Studebaker. Spec'l Six Studebaker.....Big Six	Own..... Own..... Own. Kn'gt Own..... Own.....	6-31x4½ 6-31x4½ 6-31x4½ 6-31x4½ 6-31x5 6-31x5	25.35 25.35 23.44 29.40 36.04	Strom..... Strom..... Strom..... Strom..... Ball&B.	Delco Delco West. West. Wag-R Wag-R	Delco Delco	s-p B&B. s-p B&B. m-d Fuller. s-p Own.	Mech. Mech. Fuller. Own.	m Mech. f Ther. m Spicer m Spicer	½F Tim ½F Tim ½F Tim ½F Own ½F Own	5.10 5.30 4.66 4.55 4.33 3.70	R-L-T R-L-T R-L-R R-L-R R-L-R R-L-R	
1995 2450	1995 2790	2640	2315d 2765a 1525b 1565d	2550 3490	2550 3490	120 130	32x4 32x4½	Stutz.....690 Stutz.....KLDH	Weid.....690 Own.....	6-33x5 4-49x6	27.34 30.63	Strom..... Strom.	Remy. Remy.	Remy. Delco	s-p B&B. m-d War.	Warner. Own.	m Mech. m Hart.	½F Tim ½F Own	4.66 3.75	R-L-R R-L-R	
1275	1275	.....	1485d 1895 1945f	118 32x4	118 32x4	.....	.....	Velie.....58	Own.....	6-31x4½	24.38	Strom.....	West.	A-K.	s-p Dool	Durston.	m Thie.	½F Own	4.66	R-L-R	
.....	1785	.....	2190f 2490	125 32x4½ 120 32x4½	125 32x4½ 120 32x4½	.....	.....	Washington.....6 Westcott.....48 Westcott.....44	Cont.....8 R Cont.....12 X Cont.....8 R	6-33x4½ 6-31x5½ 6-33x4½	27.34 29.40 27.34	Zenith. Rayfield. Rayfield.	Remy. Delco Delco.	Bijur. Delco Delco.	s-p B&B. s-p B&B. s-p B&B.	Warner. Warner.	..... m Peters m Peters	½F Col. ½F Tim ½F Col.	..... 4.45 4.90	R-L-R R-L-T R-L-T	
2575 1175	2475 1175	.....	3375f 3275 3475 3850g 1550c 1895p 1450c 1795	3275 3475 3850g 1550c 1895p 1450c 1795	3275 3475 3850g 1550c 1895p 1450c 1795	121 127 118	32x4½ 32x4½ 32x4	Wills Ste. Claire..A-68 Wills Ste. Claire..B-68 Willys-Knight.....64	Own..... Own. Kn'gt Own. Kn'gt	8-31x4 4-33x4½	33.80 21.03	Holley. Tillotson	Delco A-L..... A-L.....	Delco A-L.....	m-d Own. m-d Own.	Own.....	m Mech. f Own.	½F Own ½F Own	4.45 4.44	R-L-R R-L-R	
3400	3800	3400	4250c 4450p 14700s	1995 14550 14700s	1995 14550 14700s	124 132	32x4½ 33x5	Willys-Knight.....67 Winton.....40	Own. Kn'gt Own.....	4-33x4½ 6-3½x5½	21.03 33.75	Tillotson Rayfield.	A-L..... Delco.	A-L..... Delco.	m-d Own. m-d War.	Own..... Warner.	f Own. f Cli.	½F Own ½F Tim	5.12 4.68	R-L-R R-L-R	



# CURTIS AIR COMPRESSORS



Aeroplane view of Cleveland, Ohio  
—one of the world's great automotiv  
manufacturing centers.

**OHIO—"Automotive State"**  
—Population 5,759,394,  
automobile registration  
858,767. \$545,000,000.00  
worth of tires produced  
yearly in Akron alone.  
Cleveland and Toledo sec-  
ond only to one other city  
in building automobiles.

## In Ohio!



Watch the new garages and filling stations in Ohio! Note the constantly increasing proportion of *Curtis* compressors installed—Why? Because—

**1—**These purchasers knew that in the *Curtis* they could have confidence of a well known, thoroughly established and reliable product backed by an institution of 70 years successful manufacturing experience, 27 years of which have been devoted to the design and manufacture of air compressors and compressed air equipment.

**2—**The *Curtis* record of nearly 3/4 of a century in business (a period including 3 wars and several panics), a definite reputation to live up to for the future, ample capital and resources that *Curtis* have behind them—all these are assurance to these buyers that their *Curtis* compressor would not be likely to become an orphan.

**CURTIS PNEUMATIC MACHINERY CO.**

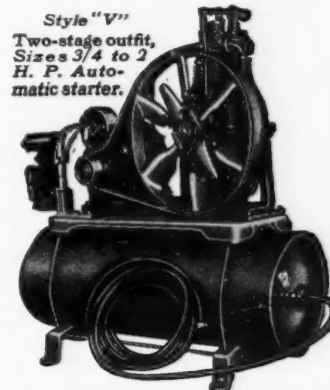
1527 Kienlen Ave. . . . . St. Louis, U. S. A.

Branch Office

530-H Hudson Terminal, New York City



# CURTIS



Style "V"  
Two-stage outfit,  
Sizes 3/4 to 2  
H. P. Auto-  
matic starter.

### No Spitting of Oil When A Curtis Cuts Out

There are two sound reasons for this. First: the exclusive and patented controlled splash oiling system prevents an excess of oil from getting into the discharge line. Second: there is no bleeding discharge pipe or intermediate tank. Automatic starting and stopping device governed by means of a centrifugal unloader.

**CURTIS  
PNEUMATIC  
MACHINERY CO.**  
1527 Kienlen Ave.  
ST. LOUIS, MO.

Gentlemen:—Please send me full details on Curtis Air Compressors, your proposition and prices.

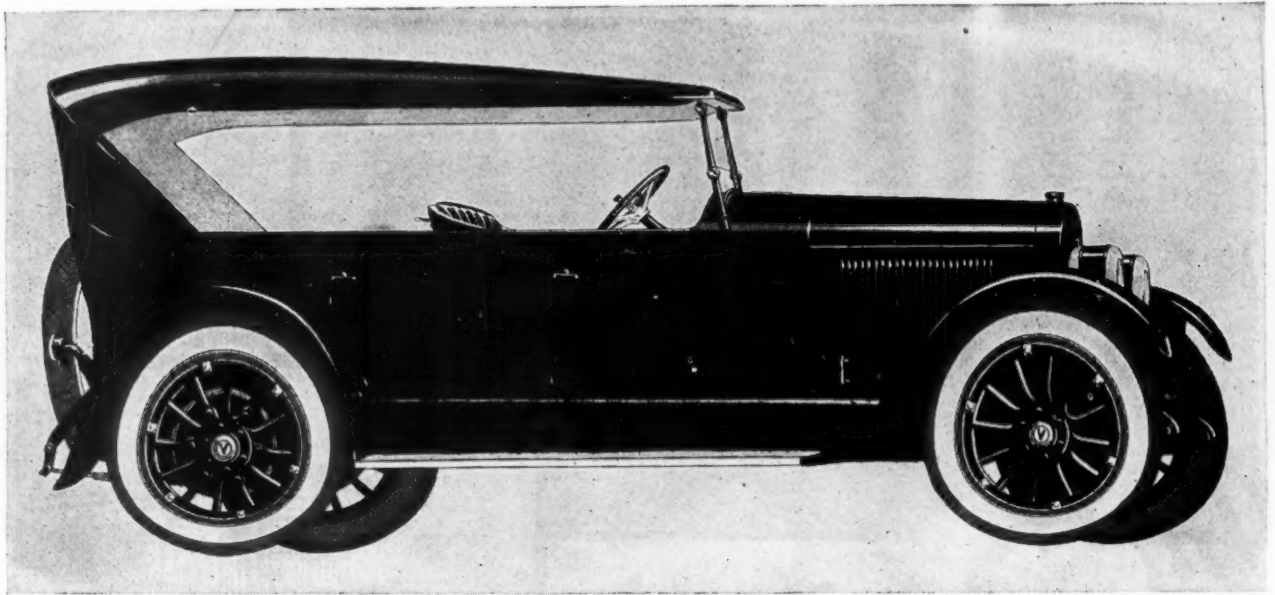
Name .....

Address .....

Jobber's Name .....

Address .....

# The World's Biggest Six in



## Here it is—a VELIE

**\$1095** *The world's largest, roomiest Six in the thousand dollar class*

(f. o. b. Factory)

VELIE, known in the industry for sixteen years as one of the ablest builders of quality cars, now achieves the unique distinction of producing the big, quality leader in the thousand dollar field.

—not only the largest, roomiest Six in this price range;—not only the most consistent performer in this class;—not only a marvel of perfect chassis balance and amazing road-riding ease;—but also one of the most economical cars to operate in any price class. It is not unusual for Velie owners to average better than twenty miles to the gallon.

Do not fail to see this car at the Automobile Shows. It is 1924's focal point of interest—the target of popular admiration.

The average car today in the thousand dollar class is 112-inch wheelbase. This long, racy, powerful beauty is 118 inches—giving the perfect chassis balance you find in cars costing many hundreds more.

You have here the spacious, relaxed comfort of more than ample seating space and leg freedom in both front and rear compartments.

And long wheelbase means even more than this incomparably greater riding comfort. It means also a slenderness of line, a grace of proportion, an aristocratic appearance impossible to effect in a car of shorter wheelbase.

Deeply upholstered cushions add a generous quota of passenger comfort to that provided by the long, underslung, semi-elliptic springs.

And now, the lustrous and lasting baked enamel finish of this quality body—sun proof, rain, snow and cold proof—the most durable finish known. Forget your paint troubles forever.

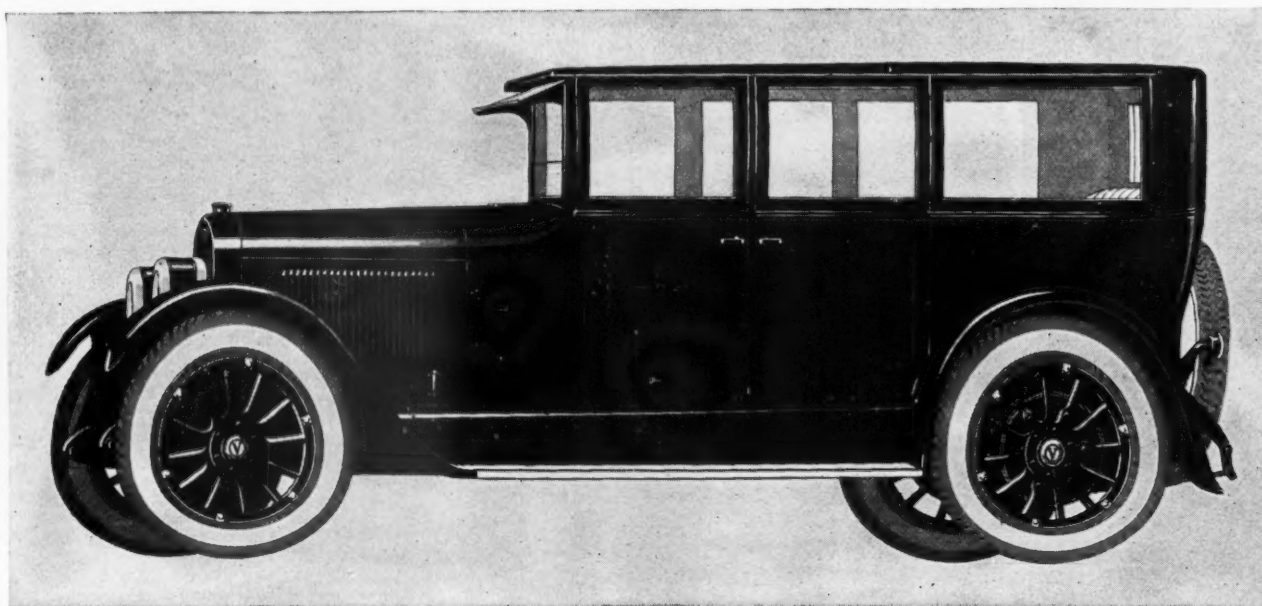
Compare this Velie, detail for detail, with other cars in this price range.

The same remarkable Velie-built

*Every time we sell a car we make a friend*



# the Thousand Dollar Class



## at a NEW low price

50 Horsepower—118-Inch Wheelbase—Baked-Enamel Finish—Remarkable Velie Motor **\$1545**

(f. o. b. Factory)

motor with its unique pressure lubricating system, force-feeding oil even to the piston pins, that has met with such broadcast success in the Velie for the past three years. It is far in advance of other engine designs in this price field and many of its features are found only in the very foremost of the high-priced cars.

The New Velie Sedan Model, mounted on the same thoroughbred 118-inch wheelbase chassis as the Touring Car, also has the lustrous and durable baked-enamel finish, attractively striped. The interior is richly upholstered and lined with a choice grade of soft-toned velour. The interior fittings are of frosted silver finish. \$1545 (f. o. b. Factory).

Now, to cap the climax: In addition to these low-priced cars, the 1924 Velie Line includes a complete series of de luxe models at somewhat higher prices. Open and closed cars, Roadsters, Sport Models etc., giving a range of body styles and a selection of equipment satisfying every possible demand.

\* \* \*

We urge every dealer seeking an improvement in his present condition to write, or wire, about contract and territory today. Don't delay. Use coupon below.

VELIE MOTORS CORPORATION  
Moline, Illinois

Velie Motors Corporation  
Moline, Illinois

Kindly send me by letter or wire full details concerning the New Velie car, contract and discounts in \_\_\_\_\_ territory, representing the world's biggest six in the thousand dollar class.

Name \_\_\_\_\_

Town \_\_\_\_\_ State \_\_\_\_\_

Every time we sell a car we make a friend

# THE AUTOMOTIVE INDUSTRY — LIKE THE TIMKEN ROLLER BEARING CO — LIKE THE

## The Industry's Scrap Book

NEW STYLE IN GASOLINE MOTOR CARRIAGES



GASOLINE MOTOR PARK TRAP

### THE DAVISES STILL REPAIRING

Toledo, Sept. 30.—The trans-continental automobile trip of Mr. and Mrs. John Davis has not proven a great success up to date. For nearly a month the Davises have been trying to get out of Toledo, but without success. Repair work on their machine kept them here for three weeks. A week ago Sunday they broke away from the city, but their tour was short-lived for in Michigan, less than a score of miles from here, they broke down again and are stalled. The automobilists were to represent a newspaper syndicate.

### A MATTER OF VANITY

"I do not think the automobile is going to be popular for any length of time with our fashionable people," said Adjutant General Corbin today. "During my recent stay in Newport I met a number of wealthy people who had purchased automobiles early in the season, and I asked them how they liked these novel vehi-

cles. Almost without exception they told me that they did not think the fad for them would last long. They said the automobile would never take the place of the horse with the fashionable set. The fact of the matter is, the swell woman does not appear to as great advantage in an automobile as she does behind a pair of fine horses."—Brooklyn Eagle.

### INN FOR TOURISTS—A WOMAN'S DREAM

"The automobile has opened a new field for women who have their own living to earn," observed a woman the other day who proposes to become the proprietor and manager of a new old-fashioned country inn. "People are just beginning to appreciate the many advantages of this novel means of travel," she observed, "and by next season I believe it will not only have taken the place of horses, but for short pleasure trips must rival the palace and observation cars."

"Don't imagine I refer to our becoming motormen as a profession. I mean that automobiles will so increase travel over country roads that bound to be a demand for well-kept houses. Inns after the fashion of those famous in the South and West."

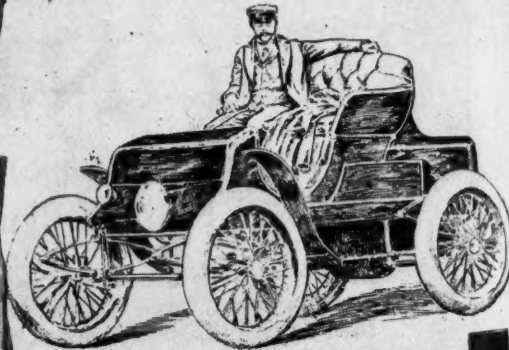
loned looking, remodeled of the Blue Dragon, other famous house, stopped in Greer house, and Virginia are the

### THE DAVISES STILL TRAVELING

Mr. and Mrs. John D. Davis have reached Chicago with their ill-fated motor carriage. Little of the original motor

and running gear mechanism with which the couple started from New York under the auspices of the New York Herald was left, the principal remainder, it is said, being the rear axle; and that broke at the crossing of 71st street and Bond avenue in Chicago. When a new axle shall have been fitted it is the intention to proceed on the way to San Francisco.

### FIRST AMERICAN RACING VEHICLE



THE INCLINE AT THE INDIANAPOLIS SHOW



H. P. 30 In. Wheels. 2,000 Lbs. \$1,800

Historical Material by Courtesy Motor Age

THE TIMKEN ROLLER BEARING CO — LIKE THE



# ENROLLER BEARING CO — IS 25 YEARS OLD

## The Timken Scrap Book

### AUTO INDUSTRY IS 25 YEARS OLD

Registered Owners During Quarter Century Have Reached Ten Million

NEW YORK, April 21.—The automobile industry as an industry has just celebrated its twenty-fifth anniversary. A quarter of a century ago the industry, which has produced over 10,000,000 registered owners during that period, remodeled the planning cities and introduced the traffic "con" struggled into being with the delivery of the first American-built car to a purchaser.

From the initial start the record of owner growth has been rapid.

### Friction Saver vs Whip

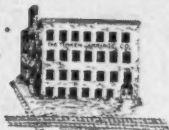
Your horse is all right. You wouldn't have to resort to old-time methods of urging him; he'd live longer and serve you better if you'd replace the whip with the

#### Timken Roller Bearing Axle.

Careful, scientific experiments show 50 per cent reduction in draft on your animal, whether driven to carriage, wagon or dray. Timken Axles are easily applied to any vehicle, old or new.

Our booklet, "Living the Whip," tells how the Timken Axle reduces the draft on the horse 50 per cent, shows how the wheel turns 100 times on the Timken Axle before being worn out, while it takes 100 times as long to wear out the axle, while it requires 10 times as much to start a wagon with the ordinary axle. Give a trial to the Timken Axle on your horse or driver of today, carriage or heavy wagon. Write for the Timken Axle or roll, send for the booklet to FREE.

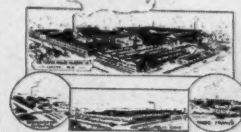
Timken Roller Bearing Axle Co., 110 E. Second St., Canton, Ohio.



It is a well-known fact that a spring is a very important part of a vehicle, but it is not generally known that a spring is also a very important part of a bearing. The Timken Tapered Roller Bearing is a bearing that is designed to handle heavy loads and to operate at high speeds. It is a bearing that is made of the finest materials and is built to last. It is a bearing that is used in all kinds of vehicles, from cars to trucks to ships. It is a bearing that is used in all kinds of industries, from agriculture to manufacturing to transportation. It is a bearing that is used in all kinds of environments, from dry to wet to cold to hot. It is a bearing that is used in all kinds of conditions, from normal to extreme. It is a bearing that is used in all kinds of ways, from simple to complex. It is a bearing that is used in all kinds of places, from the city to the country to the mountains to the sea. It is a bearing that is used in all kinds of times, from the past to the present to the future. It is a bearing that is used in all kinds of ways, from simple to complex. It is a bearing that is used in all kinds of places, from the city to the country to the mountains to the sea. It is a bearing that is used in all kinds of times, from the past to the present to the future.

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### The Pioneers

THE human animal quickly takes things foregranted. The nurseryman soon loses his ability to smell the rose; and, happily, the truck gardener soon does not smell the cabbage.

And we, "buddying" with it, speak of the Automotive Industry hundreds of times a day—superficially, thoughtlessly, with the coldness of habit.

There's more to it than just Business. Brilliant, ingenious men don't link themselves for life to penny-chasing business.

Business, yes! But Romance, and Faith, and Fiery Spirit of Adventure. Business, yes! But the business of "going somewhere"—"moving"—"on the jump"—"majestic transportation"—"miraculous motion."

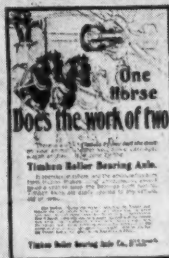
Americans, it is alleged, have mortgaged their homes to buy motor cars. Pessimists claim that today 80% of the sales are "on time." And the professional fretters wring their hands!

But meanwhile the Scranton drug-clerk tours New England and the Gopher Prairie machinist takes his kids motoring to Niagara Falls.

We hereby appoint those old fogies—"nuts" they called them then—who with vision and (it's the only word) guts looked ahead into, say 1923, and worked; we appoint those sweating pioneers, Haynes, Apperson, Olds, Duryea, Timken, Winton, et al, as the real "See America First" Campaigners.

And rather far-sighted in their seeing, too!

Editorial from The Daily SAE,  
White Sulphur Springs, W. Va., June, 1922, by  
The Timken Roller Bearing Company, Canton, Ohio



### An Early TIMKEN Advertisement 1901

Since then—80,000,000 Timken Tapered Roller Bearings—the best Timken Bearing advertisement

The Timken Roller Bearing Co. CANTON, OHIO

### TIMKEN Tapered ROLLER BEARINGS



Henry Timken Sr. in one of the early Timken-equipped horseless Carriages

# CONNECTICUT

## IGNITION



*Show It—They'll Buy It!*

### *The Connecticut Universal Switch*

*For Ignition and Lights*

is One Hundred Per Cent—from both merchandising and mechanical standpoints.

Designed to match other items of equipment—  
To go on either wood or metal dash—  
To control the ignition as well as the lights—  
To work with practically all lighting arrangements—  
To lock the car against theft.  
This switch—one of the most beautiful ever developed—not only performs every function perfectly, but by reason of its universal adaptability does away almost entirely with the need of stocking a number of different switches—and tying up a lot of money in the stock of each.  
To meet the demands of your trade.  
The switch block of Cetec is mounted on a heavy cast aluminum plate, highly polished and finished

with a black enamel. Equipped with mounting studs of generous length.

The lighting control lever snaps into its Bright, Dim and Off positions with a crosswise toggle action. For the ignition control, the key of a high grade change pin tumbler lock is used instead of a lever. The ignition cannot be switched on without the proper key. Key cannot be taken out while the ignition is on. Removing key (when in Off position) automatically locks car against theft.

Never before has any ignition-lighting control combined such beauty, and practicability with anything like the merchandising possibilities of this master replacement switch.

Price \$4.50

Packed complete with mounting instructions. Send for Connecticut Accessory Bulletin No. 70.



**CONNECTICUT**  
MERIDEN

TELEPHONE  
& ELECTRIC  
Ignition Division

**COMPANY**  
CONNECTICUT





# Heat-shaped to insure perfect roundness

**A**MERICA'S finest piston rings at almost the price of a snap ring!

The quality that has made Pedrick rings the choice of America's finest cars is now priced on a big production base!

The new price schedule—

<b>Fords and Chevrolets</b> .....	25c
3 $\frac{7}{8}$ " .....	30c
4"-4 $\frac{7}{8}$ " .....	35c
5"-5 $\frac{1}{2}$ " .....	50c

Oil Control rings are the same price!

This is your opportunity to share in the increased business that Pedrick rings at these prices will bring!

*Write for complete list and discounts!*

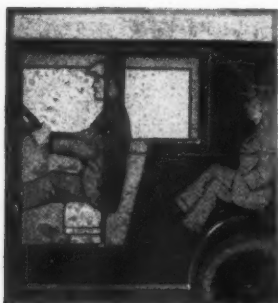
**WILKENING MANUFACTURING COMPANY**  
15th and Mt. Vernon Sts. Philadelphia, Pa.

**Pedrick**  
HEAT-SHAPED  
PISTON RINGS

# The Champion Money



Front seat adjusts to three positions to accommodate short driver or tall driver.



Rear seat adjusts backward—no crowding behind when front seat is moved back.

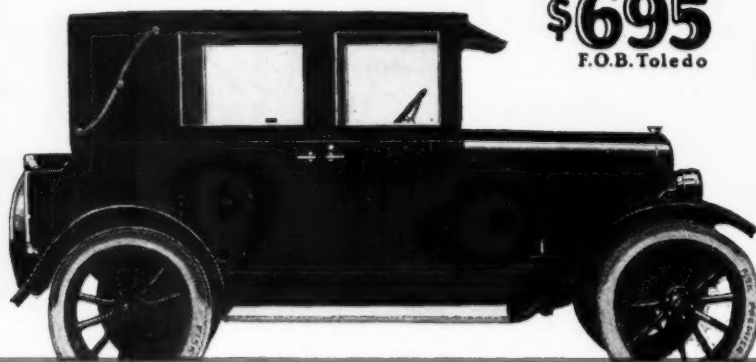


Both seats and upholstery make into a full-length, full-width bed in car.



**NEW**  
*Overland*  
**CHAMPION**

**\$695**  
F.O.B. Toledo



See how easy it is to load and unload milk cans, boxes, bags, feed, seed and groceries.



50 cubic feet of clear loading space by removing rear seat and upholstery.



Comfortable seating for five, with wide doors both front and rear—no seat climbing.

*The first real all purpose car*

*The Most Automobile  
in the World for the Money!*

# WILLYS-



# Getter for Dealers!

**T**HE new Overland Champion is very, very much a champion—the greatest selling proposition ever built upon four wheels! Champion in its many-sided usefulness. Champion in price. Champion in history-making sales. Champion in the stream of profits it is bringing to all Willys-Overland dealers!

Across the way on the opposite page is the whole story of the Overland Champion's unique and compelling appeal to salesmen, merchants, farmers and the American family. A business car and a family car in one. Features, utilities and benefits the whole country is talking about.

Adjustable seats for short people and tall people! Take out the rear seat and upholstery and there is 50 cubic feet of clear square carrying space for samples, luggage, trunks, camping paraphernalia, farm implements—what-not! Front and rear seats and upholstery make up into a full-size bed in the car for camping tours! Doors front and rear! Large trunk at small extra cost.

Think of the Overland Champion in a personal way—in terms of its all-useful appeal in your own community. Think of the number of ready prospects there are for this car living all around you. Think of the big selling advantage you would have in showing and demonstrating this amazing car.

Think of the further advantages of doing business under the fairest, friendliest automobile franchise ever written—with a line of cars beginning with the Overland Touring at \$495 and graduating up to the big, luxurious 7-passenger Willys-Knight Sedan at \$1995—all big sellers!

Here is complete coverage in the greatest automobile market that exists. More than 90 per cent of all motor cars sold list under \$2000! How much of this vast price field do you cover? How many of these under-\$2000-prospects are getting away from you?

Think of your past—think of your future. Write or wire for the whole Willys-Overland story.

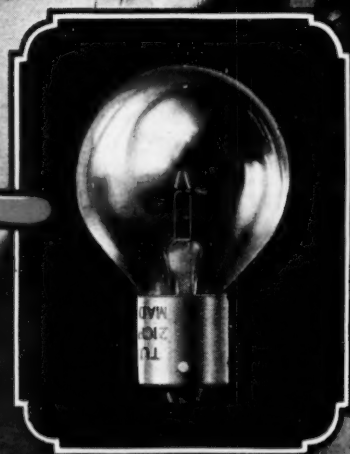
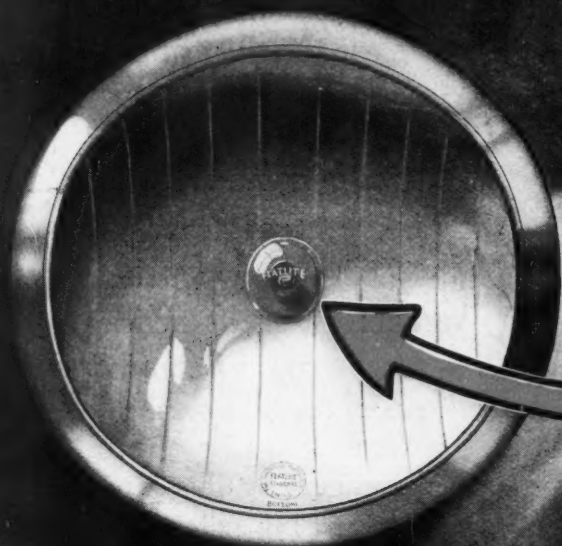
*America's Only Versatile Car*

WILLYS-OVERLAND, Inc., TOLEDO, OHIO  
Willys-Overland Ltd., Toronto, Ont.

# OVERLAND

# TUNG-SOL

"FLATLITE" and "Fixed Focus" Lamp Bulbs



*Approved for Flatlite and other parabolic reflectors*

TUNG-SOL lamp bulbs marked "FLATLITE" on the glass bulb and "FIXED FOCUS" on the metal base are approved for use in Flatlite Standard Reflectors with either fixed or adjustable focus.

Good road lighting is only attained when the filament in the bulb is of small dimension and is accurately positioned in the bulb. The marking "FLATLITE" and "FIXED FOCUS" on a TUNG-SOL bulb is a guarantee that these essentials are met.

Those states with the largest car registrations have approved the use of FLATLITE Standard Reflectors equipped with TUNG-SOL "FLATLITE" and "FIXED FOCUS" bulbs. This wide acceptance conclusively demonstrates the efficiency of both units. The recognized quality of TUNG-SOL has attained for this bulb, a pre-eminent position in the industry.

TUNG-SOL "FIXED FOCUS" bulbs have been generally adopted for standard headlamp equipment and may be used in any headlamp.

**MINIATURE INCANDESCENT LAMP CORPORATION**

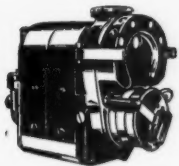
Newark, N. J.

*Licensed Under General Electric Company's Incandescent Lamp Patents*

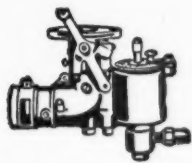




## The Motorist Appreciates Fixed Adjustment



Adjustments on magnetos, for instance, have always been fixed at the factory; and these units have ever been noted for dependability.



Zenith Carburetors, too, are adjusted by the maker; and their record of performance is world-wide.

Overheated motor—cylinders scored or bearings burned out from diluted oil—fouled plugs and valves—any of these misfortunes bring home to the motorist the evils of mis-adjustment of the carburetor and impress him with the advantage of *fixed adjustment*.

### ZENITH CARBURETOR

Nearly two hundred American manufacturers of motor cars, trucks, motorcycles, tractors, cabs, buses, motor boats and engines have standardized on Zenith, primarily because it insures a uniform, high standard of both performance and economy.

Our engineers and our service men are at your call, to prove Zenith value on your motors.

## ZENITH-DETROIT CORPORATION

Manufacturer of

### ZENITH CARBURETORS

DETROIT

MICHIGAN

Branches:

NEW YORK

CLEVELAND

CHICAGO

Service Stations in over 800 cities

# Greater Owner Satisfaction With Gabriel Snubbers

A car equipped with Gabriel Snubbers gives the owner greater satisfaction.

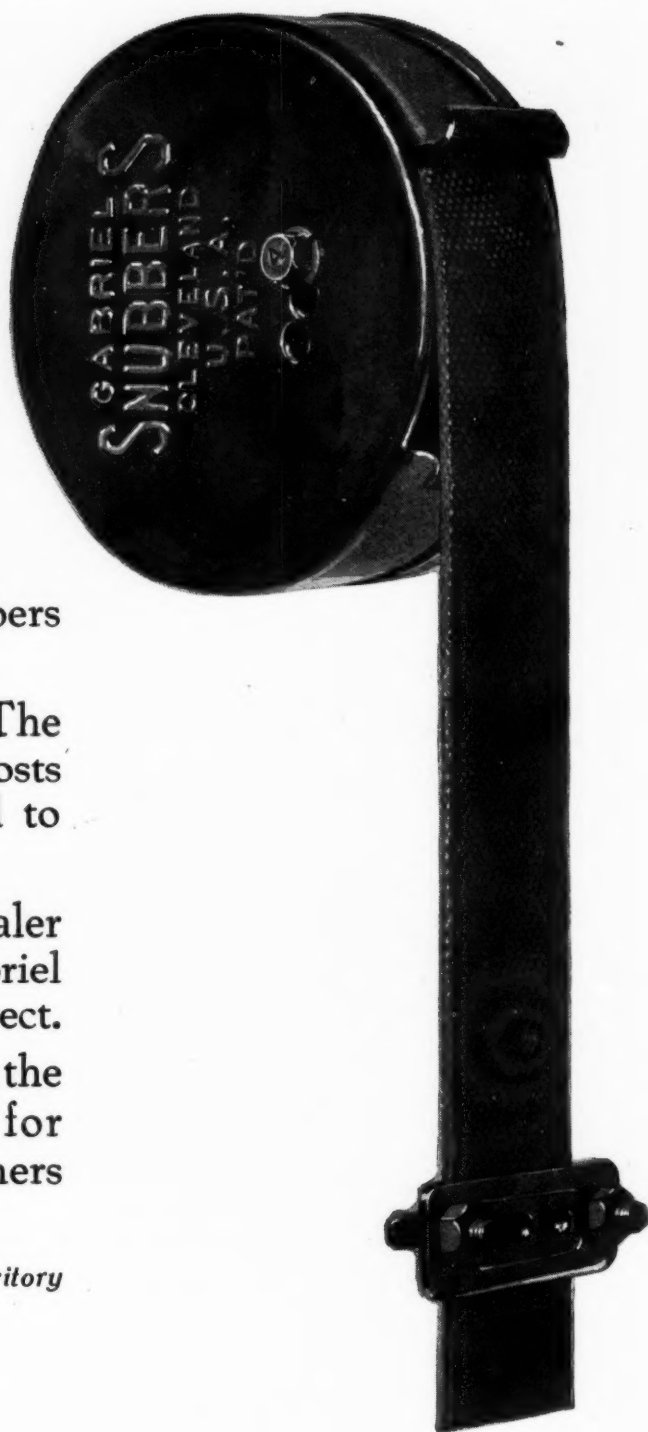
The car is saved from road shocks. The passengers enjoy more comfort. It costs less to operate. Servicing is reduced to a minimum.

This is of great importance to the car dealer and thousands of dealers urge Gabriel installations and many install them direct.

The new Gabriel selling policy offers the car dealer an excellent opportunity for profit in addition to assuring the car owners greater pleasure from their cars.

*Communicate with the Gabriel Distributor in your territory or write us direct*

GABRIEL MANUFACTURING COMPANY  
1415 East 40th Street • Cleveland, Ohio  
Gabriel Manufacturing Co. of Can., Toronto, Ont.  
~ Sales & Service Everywhere ~



# Gabriel

GABRIEL  
**SNUBBERS**

Greater  
Riding  
Comfort

# Snubbers



yes!

it's a low-priced  
car — and bigger  
discount . . . .

yes!

Your market for this car is assured.  
It sells under \$1,000 and out-performs  
anything in this class.

yes!

It has big-car ability and appearance  
with small-car convenience and  
economy.

yes!

You have added assurance of greatly  
increased profits because of the bigger  
discount.

yes!

The company is one of the oldest  
and bankers everywhere regard it as  
one of the most sound.

yes!

You can understand this simple one-  
page contract without calling in your  
lawyers.

yes!

You'll make more money with this  
contract.

Write or wire Box 6100, Motor Age,  
5 So. Wabash Ave., Chicago.



## REPUTATION

THE J. I. Case T. M. Company is known in practically every city, town and village in the United States. For more than eighty years it has had a splendid reputation for stability, strong financial standing and honorable business practice. Its trademark is world famous.

To motor car distributors and dealers this is a tremendously valuable asset. "Case" needs no explanation. Confident acceptance has become a habit.

J. I. CASE T. M. COMPANY, RACINE, WISCONSIN



**CASE**  
MOTOR CARS



---

THE SIGN OF MECHANICAL EXCELLENCE

---



---

FOR MORE THAN EIGHTY YEARS

---



# Fear and Finishing



**A**BOUT seventy percent of automobile bodies are still being finished with paint and varnish.

The centuries of paint tradition and the craftsmanship which has been handed down from father to son through countless generations command our respect.

But we, in common with millions of other people, are continually struck by the stubborn fact that the finish on the average motor car of today does not serve its purpose—it checks, or lifts, or becomes lustreless in a very few months.

Even with such evidence of unfitness before the automotive industry—it is no light matter to uproot and throw out a system of finishing which time has entrenched so thoroughly.

The up-to-date paint superintendent is quick to understand the Oxvar method and its revolutionary advantages. He knows it is unlike paint and varnish, not a matter of guess work—an unexplored mystery to be feared—but a simple thing that can be proved up in the laboratory quickly and conclusively. It needs no endorse-

ment of tradition. It is not a craft. It is a scientific process.

By the Oxvar method, you can give any body from three to five coats of high-baked enamel in from  $4\frac{1}{2}$  to  $7\frac{1}{2}$  hours at less than  $\frac{1}{2}$  the cost of average paint and varnish finishing.

Remarkable as it may seem, a wood-frame body can receive Oxvar 400° enameling perfectly. The same method that applies to all-metal bodies, applies to wood-frame bodies, except that wood frames are coated to protect them against the successive 400° heats.

The result is a finish that lasts as long as the car. It cannot check or lift or lose its lustre—because the Oxvar process has removed the causes which lie back of these age-old defects.

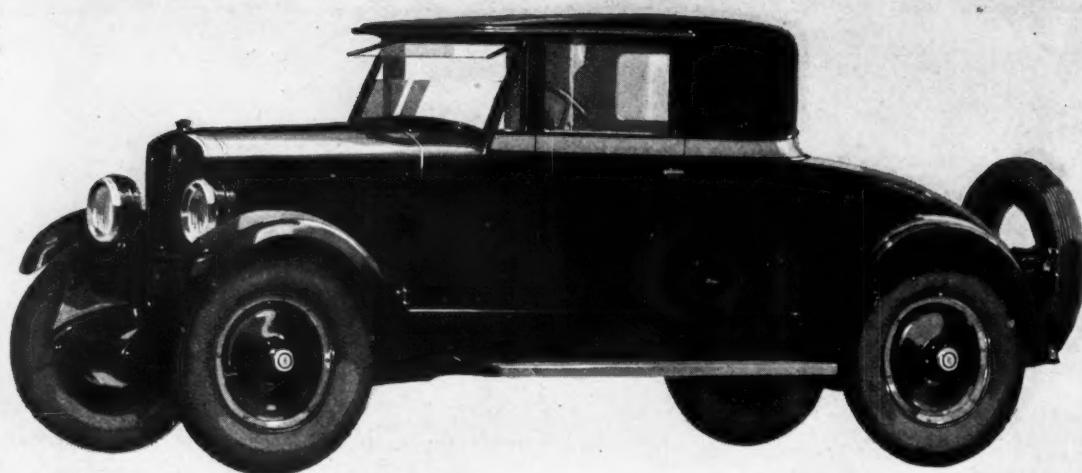
We wish to place at your command production records showing the result of the Oxvar method, also complete laboratory tests confirming what has been proven in practice.

A booklet describing Oxvar (for production of twenty-five bodies or more daily) will be mailed on request.

## OXVAR

### OXFORD VARNISH CORPORATION

Main Office: Empire Building, Detroit  
Plant: Toledo, Ohio



## We predict that the new Rollin will be the center of attraction at the New York Automobile Show

European type, light weight, small displacement, high compression, high speed, 4-cylinder highly refined motor.

4-bearing crankshaft.

4-wheel brakes—internal type—same as found on the most expensive cars.

Firestone balloon tires.

A costly force feed lubrication system to all rotating motor bearings.

25 to 30 miles per gallon of gas.

Touring Car De Luxe,	-	\$ 975*	Five Passenger Sedan,	-	\$1275
Three Seated Coupe Roadster,	-	1175			Prices f. o. b. factory.

\*This same model with wood wheels, cord tires and 4-wheel brakes but without De Luxe equipment, \$895

*On exhibition during the New York Automobile Show at the Commodore Hotel.  
On Exhibition during the Chicago Automobile Show in the Elizabethan Room at the Congress Hotel.*

THE ROLLIN MOTORS COMPANY, CLEVELAND, OHIO

# ROLLIN





## Standard Equip- ment on the best Portable Drills



IN the Automobile plants of Detroit, where wheels hum constantly to keep up with production schedules and tools are put to severe tests day-in-and-day-out — JACOBS CHUCKS are used almost exclusively.

Throughout the Industry you will find Jacobs Chucks on the best Portable Drills made and used.

Jacobs Quality is responsible for this.

Jacobs Quality is YOUR guarantee.

THE JACOBS MFG COMPANY, HARTFORD, CONN.

*This advertisement inserted in the interest of better Service Equipment in general and of the use of Portable Electric Drills in particular*



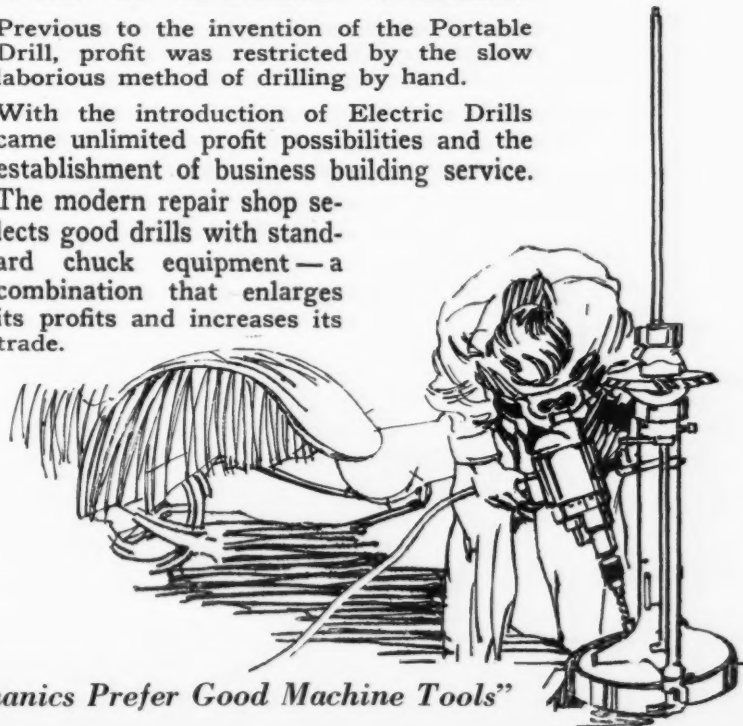
**(CATALOGED)**  
*in the Red Directory*

## A Quick Repair Job on a Rear Axle

Previous to the invention of the Portable Drill, profit was restricted by the slow laborious method of drilling by hand.

With the introduction of Electric Drills came unlimited profit possibilities and the establishment of business building service.

The modern repair shop selects good drills with standard chuck equipment — a combination that enlarges its profits and increases its trade.



*"Good Mechanics Prefer Good Machine Tools"*

The TEMCO ELECTRIC  
MOTOR COMPANY  
LEIPSIC OHIO

**TEMCO**  
Trade Mark

LEIPSIC

OHIO

# LINCOLN



Answering  
12 Questions  
Dealers Ask  
About Lincolns

No. 4

## How Do I Know Lincolns Will Satisfy My Customers?

Because Lincolns have already proved it. Thousands of sets have been sold to satisfied users and the percentage of buying has steadily increased.

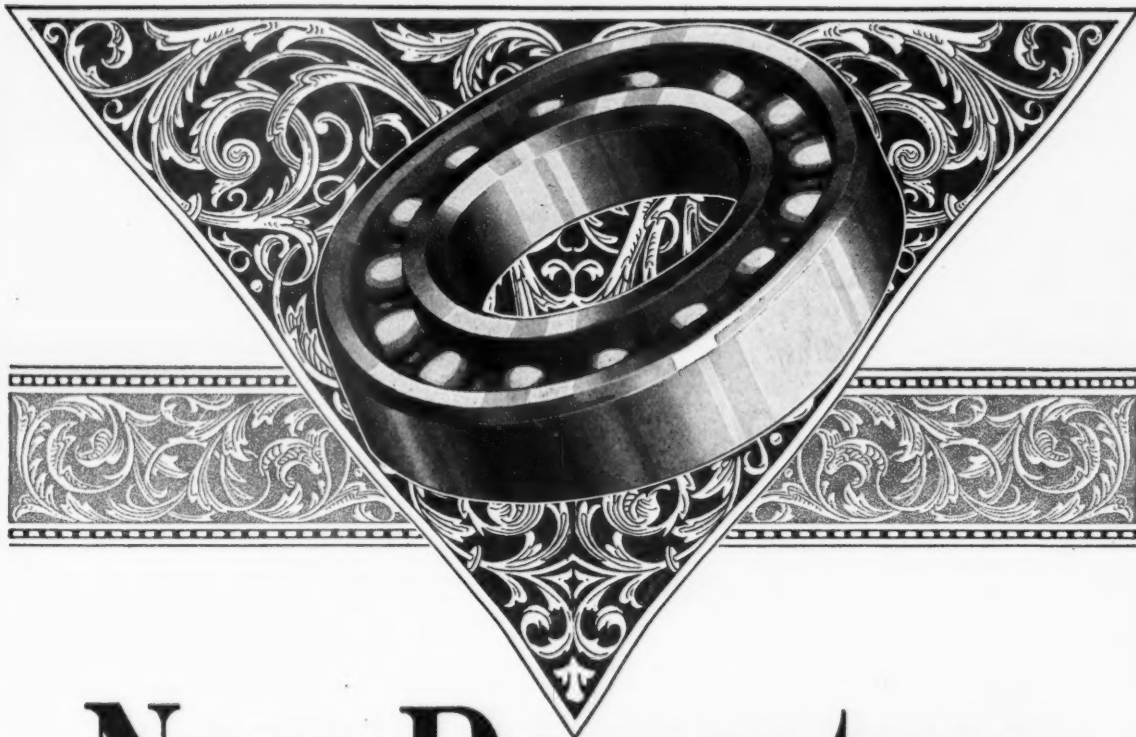
Lincoln Shock Absorbers are not new. They have been manufactured for seven years. They are fully tested. We guarantee them to do what we say or to refund the purchase price willingly.

*You can sell Lincolns with confidence and profit. Let us send you our dealer sales and profit plan.*

LINCOLN PRODUCTS COMPANY  
1251 South Michigan Avenue, Chicago

# SHOCK ABSORBERS





# New Departure Ball Bearings

## Where Faith is Well Founded

**M**ILLIONS of motor cars are driven today by those who would be absolutely helpless if called upon to render more expert attention to their vehicle than that of changing a tire.

Yet how many of this number would hesitate to undertake a 200-mile jaunt at a moment's notice?

This confident independence is due, we believe, not so much to the proximity of service stations and fellow tourists as the well-placed confidence in their "motors" to negotiate any trip without falter.

Almost all parts of the modern motor car function properly for extended periods without re-adjustment.

In bearings, the New Departure ball type, by principle and superfine materials and manufacture, has been developed to a point so closely approaching perfection that it functions properly for the life of the average motor car — and without wear which must follow in other bearing types which require re-adjustment at stated intervals.

THE NEW DEPARTURE MANUFACTURING COMPANY  
BRISTOL, CONN.

Detroit

Chicago

# REPUBLIC

## *Yellow*

## *Chassis*

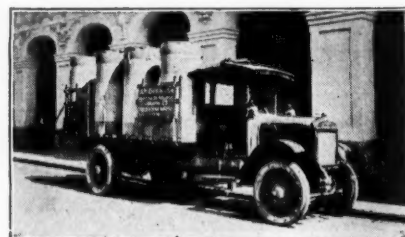
## *Trucks*

Our Republics have given us such satisfactory service, that we do not believe we will be purchasing any trucks for some years to come. One of our trucks has been in service since 1918, and the other since 1921, and they look as if they would be good for the next twenty years at least, and they are under hard usage each day.

WILCOX LUMBER COMPANY  
Detroit, Minn.



*A Republic Truck in Bus Service in India,  
a popular Republic field*



*Republic Trucks are widely used in Cuba  
—both for Heavy Duty and Rapid Transit*



# L I C

FARMERS  
USE THEM

DECORATORS  
USE THEM

PACKERS  
USE THEM

RAILWAYS  
USE THEM

TAILORS  
USE THEM

MOVERS  
USE THEM

RESORTS  
USE THEM

GARAGES  
USE THEM

MINES  
USE THEM

GAS WORKS  
USE THEM

QUARRIES  
USE THEM

GROCERS  
USE THEM

PRINTERS  
USE THEM

WHOLESALEERS  
USE THEM

RETAILERS  
USE THEM

PUBLISHERS  
USE THEM

BILL POSTERS  
USE THEM

FLORISTS  
USE THEM

EXCAVATORS  
USE THEM

MOVIES  
USE THEM

TANNERS  
USE THEM

BINDERIES  
USE THEM

HOISTERS  
USE THEM

CLEANERS  
USE THEM

FOUNDRIES  
USE THEM

STORES  
USE THEM

ROOFERS  
USE THEM

MARKETS  
USE THEM

DRUGGISTS  
USE THEM

BUS LINES  
USE THEM

NURSERIES  
USE THEM

SAWMILLS  
USE THEM

REFINERS  
USE THEM

STEEL MILLS  
USE THEM

HOSPITALS  
USE THEM

CITIES  
USE THEM

IRON WORKS  
USE THEM

POLICE  
USE THEM

HUCKSTERS  
USE THEM

BAKERIES  
USE THEM

UTILITIES  
USE THEM

TOWNSHIPS  
USE THEM

SHIPPERS  
USE THEM

VETERINARIES  
USE THEM

CLUBS  
USE THEM

FURRIERS  
USE THEM

PARKS  
USE THEM

MAGAZINES  
USE THEM

CONTRACTORS  
USE THEM

THEATRES  
USE THEM

## Access Means Success!

Access to the market! Access to ALL the market—that is what determines consistent profit in the truck business nowadays.

Anybody who uses or should use a truck, anywhere a truck can be used, is now a Republic prospect. Every region where any industry has a transportation problem, is now Republic territory. If you're armed with a contract for the Improved Republic, *all* the market is yours.

There are strong facts to support these strong statements. Republic, since the first one was turned out, has always been a high grade job. Today's IMPROVED Republic is the last word. Engine, axles, brakes, drive controls, and other vital parts have taken on new character. The results are more power, lower maintenance, longer life, and greater driving ease.

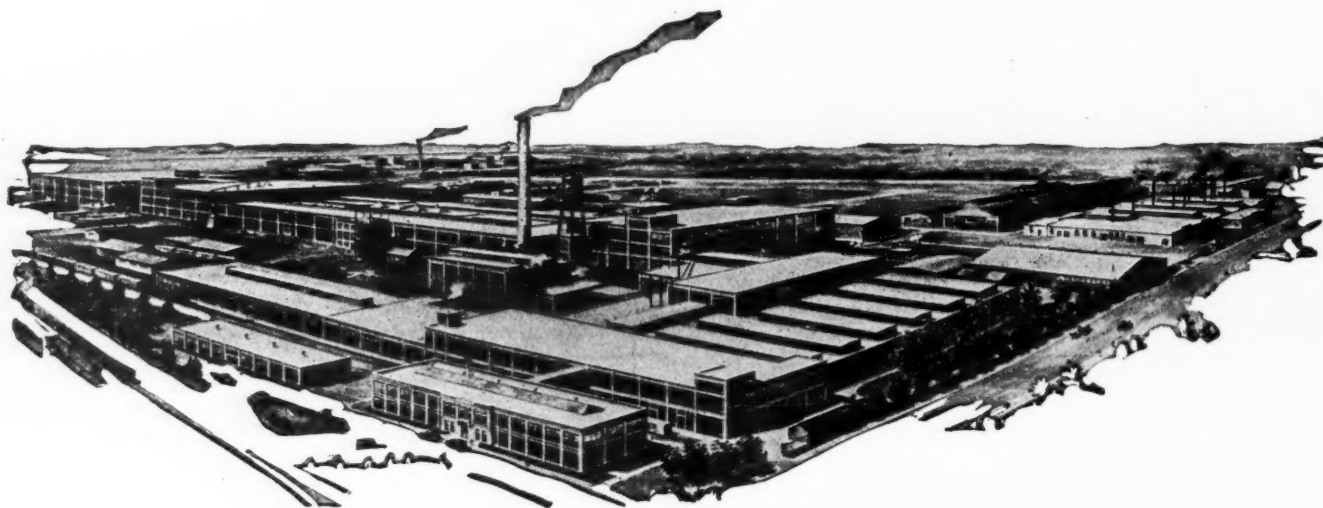
Republic has completely outclassed every other truck made by an exclusive truck maker as to number in use—and the Improved Republic is swiftly increasing the margin. The Improved Republic has a geographical distribution that includes every state in the Union and many foreign countries. And the Improved Republic figures in the transportation plans of *every* field of business using trucks.

When you consider that a fast-stepping, self-starting, experienced organization is in charge at the factory, with plenty of capital, and a clear field—then the Republic franchise stands out in startling comparison with ordinary contracts.

### REPUBLIC MOTOR TRUCK CO., INC.

ALMA, MICHIGAN

*More Trucks in Use than any other Exclusive Truck Builder*



## Concerning Success

The evident signs of success—the proof that Prest-O-Lite is fulfilling a definite need of motorists—are seen in the many thousands of Prest-O-Lite stations, and in the great Prest-O-Lite factory across from the Speedway at Indianapolis.

But the reason for Prest-O-Lite success is found in its contribution to the success of others.

For instance—a cab company writes: “Your success is contributing to ours, and of this we are both conscious and appreciative.”

The owner of a truck fleet finds that Prest-O-Lite gas assures dependable—more economical and faster deliveries.

Everywhere trucks or motor cars run, Prest-O-Lite batteries or Prest-O-Lite gas contribute to better service. This reputation is at once the greatest pride and responsibility of Prest-O-Lite. By the same token it is the greatest protection to the motorist.

**THE PREST-O-LITE COMPANY, Inc.**  
*Indianapolis, Indiana*

New York Office: 30 East 42nd Street

Pacific Coast Office: 599 Eight Street, San Francisco

In Canada: Prest-O-Lite Company of Canada, Ltd., Toronto



*Dealer Note: If there is no Prest-O-Lite distributor in your city you can buy direct from our factory at factory prices. Write us.*



*Try to strip these  
Threads~*



Even an EMPIRE case hardened cold punched steel nut, which is admittedly the strongest nut produced, cannot strip the thread of an EMPIRE *New Process* BOLT.

You might strip it with a sledge hammer—but that's another matter.

The EMPIRE *New Process* BOLT is the latest product of the world's foremost bolt and nut plan, where cold punching and cold heading originated. The lower part of the new bolt is threaded,

WITHOUT CUTTING, by a unique method.

The result is a thread so strong that nothing can strip it or break it—and so accurate that it gauges unflinchingly to within not more than .0005".

Imagine what this means in speeding up work in your assembling departments.

There is no advance in price over other EMPIRE BOLTS. Write for samples, and make your own tests.

**RUSSELL, BURDSALL & WARD**  
**BOLT & NUT COMPANY**

PORT CHESTER, N.Y.

PEMBERWICK, CONN.

CHICAGO

SAN FRANCISCO

ROCK FALLS, ILL.

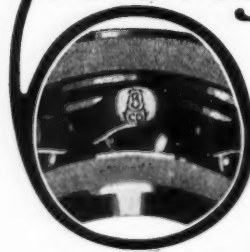
*Makers of Bolts, Nuts and Rivets Since 1845*

**EMPIRE** *New Process* **BOLTS**



# BEARINGS

*for every application*



At *thirty-seven* transportation centers we have located factory owned branches each having complete stocks of Ball & Roller Bearings to give you 24 hour service *on any Ball or Roller Bearing for any application*

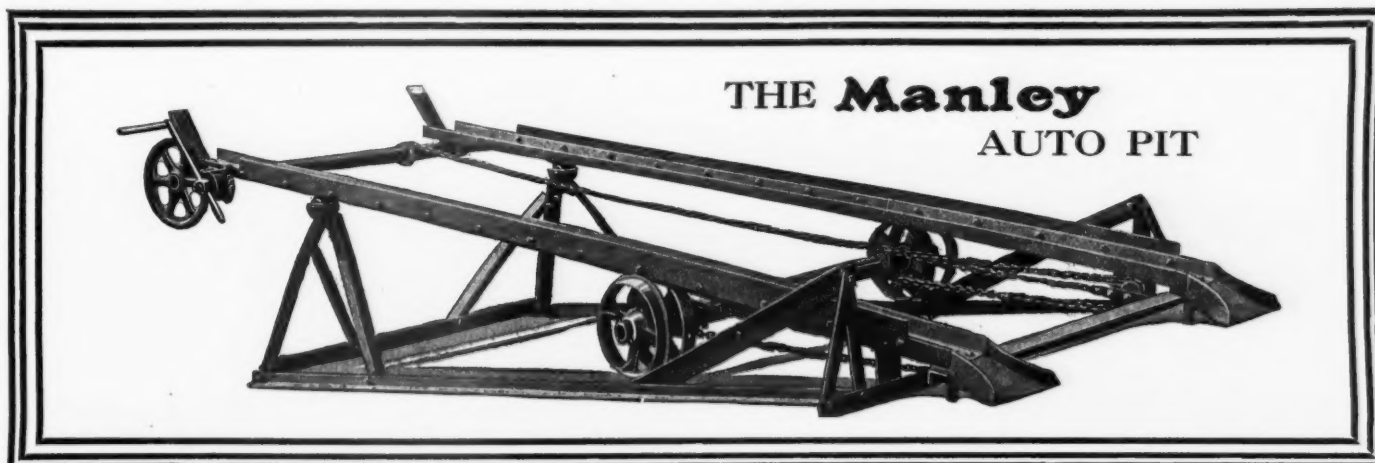
**BRANCHES**

*In thirty-seven cities!*

**AHLBERG  
BEARING  
COMPANY**

321 East 29<sup>th</sup> St. Chicago





## The first successful one-man device for elevating a car

Takes up the space of only a single car in your Garage. Run the car on the track under its own power. Turn the crank for sixty seconds, and up it goes, thirty inches from the ground and in a horizontal position, ready to efficiently work under the chassis.

The pulling chains are close to the tracks on each side, and there is no brace or cross-member anywhere to interfere with getting at any part of the chassis.

The car rests upon steel tracks, supported on a steel foundation. Perfectly safe. Cannot run off or come down. Thoroughly braced and rigid. You can pull as hard as you want on any part of the chassis, with the assurance the car will not swing or surge.

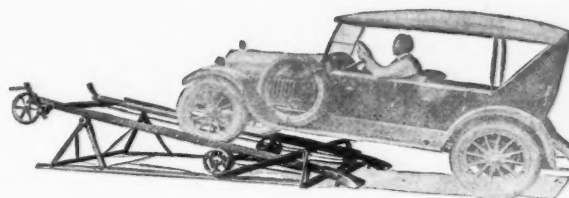
Provision is also made to lock the roller shaft independent of the side chains. Note how the roller shaft is pulled up the incline track, and elevates the main tracks—absolute simplicity. Nothing to get out of order—quick and safe.

All work under the chassis can be performed in one-half the time with a car on the Manley Auto Pit than working on a Creeper. Two or more men can work at the same time to speed up the job.

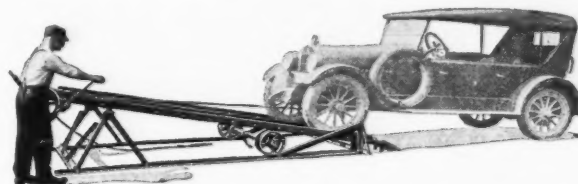
Efficiency in the Shop is now demanded by motorists, and the Manley Auto Pit produces more efficiency in every shop than any other piece of Equipment in the world. The antiquated practice of trying to do precision work on a creeper must go and *go fast* since the introduction of the Manley efficient Auto Pit.

Write us for full details. Order from your Jobber.

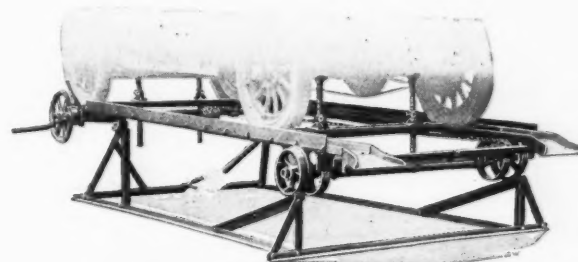
MANLEY MFG. CO., York, Pa.



Run the car up the tracks under its own power. Nothing to adjust, nothing to attach or get ready, no preliminary work. This takes thirty seconds. Turn the crank for sixty seconds, elevating the low end of the car thirty inches from the ground—an ideal working height.



A car with a dead motor is pulled up by using one of the chains.



Car elevated. Note the four Jacks supporting the car from its frame. Indispensable for properly adjusting four-wheel brakes, changing springs, etc.

# Get a Manley



CAR washing is an easier job with the Gaylord Ideal Overhead Washer. A 9 ft. swivel enables the washer to reach all sides of the car with a short hose. Counterbalanced to make swinging easy. For night washing, a flood of light is always directly over job. Rotor brush contact—no wires to twist. When used with the "Little Giant Water Saver," the water flow is controlled *automatically* at the end of the hose. No pulling of overhead—no possibility of overhead water leaks. The lowest priced overhead system with water saving feature. Order thru your favorite Jobber.

- |  |      |
|--|------|
| No. 1. Without counterbalance.....                             | \$12 |
| No. 2. 1/2-in. size, with counterbalance .....                 | \$14 |
| No. 3. 3/4-in. size, with counterbalance .....                 | \$16 |
| No. 4. 1-in. size, with counterbalance and electric light..... | \$34 |



# Why Pay for wasted water.!

**SAVE** half your water bill by cutting water leaks!

It's no "painful saving process" when the "Little Giant" does it for you. The Little Giant Water Saver works *automatically*—without your least effort or attention.

When you want water, you just grip the nozzle of the Little Giant in the natural holding position. The instant you release your grip on the valve, the water **STOPS** automatically, by means of a back check-valve.

A red rubber hose nozzle prevents metal contact with car. The construction will please any mechanic. Metal parts are brass; reinforced washers. The list price is \$3.00.

Get our Free Booklet 'BEATING THE WATER METER,' which tells about these and other water saving devices. Also mention whether you wish us to send a "Little Giant" on approval.



The  
Gaylord  
Mfg. Co.,  
Paterson, N. J.

Send me your free booklet, "BEATING THE WATER METER!" Also send me a "Little Giant" Water Saver for my inspection. If satisfied, I will pay my Jobber \$3 less discount.

THE GAYLORD MFG. CO.  
Paterson, New Jersey

**GAYLORD LITTLE GIANT  
Water Saver**

Name .....

Address .....

Jobber's Name.....

Jobber's Address.....



# Building Durability Into Your Motor Car

No road is too rough, no weather too severe for your motor car if it has Hyatt roller bearings in the motor, transmission and axle.

These bearings with their durable, high-grade steel rollers, their positive self-oiling action and their ability to prevent noise and vibration assure you of:

- 1 Years of dependable operation without need of bearing adjustment or replacement.
- 2 A quiet running car on all roads, in all kinds of weather.
- 3 Minimum repair costs.
- 4 Maximum pleasant, economical transportation.

When the manufacturer of your car builds in Hyatt roller bearings, he builds in these desirable features for you.

HYATT ROLLER BEARING COMPANY  
NEWARK DETROIT CHICAGO SAN FRANCISCO

Worcester Milwaukee Huntington, W. Va. Minneapolis Philadelphia  
Cleveland Pittsburg Buffalo Indianapolis



# HYATT

Quiet

## Roller Bearings

## BUILDING WRENCH SALES—and PROFITS!

Is your wrench and tool business showing a good profit? Are you handling a line that makes it possible to turn every prospect into a sale?

If not, you owe it to your business to investigate MOSSBERG Wrenches and the "All-Mossberg" plan today.

A superior line of wrenches and tools at a moderate price—a quick turnover—well balanced assortments to aid selling—a complete line—and unusual co-operation in the way of sales helps—you get all these—and better business—when you deal with Mossberg.

### SPEED BRACES

Mossberg Speed Braces with the famous "Double Strength" construction are efficient, sensible tools which handle the most difficult job with ease. Like all Mossberg Wrenches and Tools they are made of high grade chrome steel. The dealer will find these Speed Brace Socket Wrenches fast sellers—in sets and individually. "Silent Salesman" "2510" features these wrenches, together with "Tee" handle and offset socket wrenches.

### "EVER-WEAR" SOCKET WRENCHES

Mossberg "Ever-Wear" sockets are built to obtain the maximum amount of strength in socket wrenches. Note the round shape of socket giving added thickness. They carry, in addition to the regular Mossberg guarantee, further assurance that they will withstand the most exacting work.

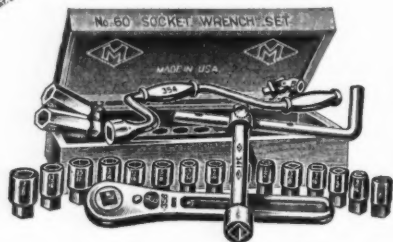
We illustrate here the No. 60 "Ever-Wear" Socket Wrench Set containing wrenches and sockets for every possible type of repair and assembly work.

### TOOLS FOR FORDS

A wrench or tool for every conceivable nut or bolt—for every kind of Ford repair work—is found in the Mossberg line of Tools for Fords. The Ford owner is your best wrench prospect. The Ford Tools are sold in sets or individually. The 600 "Salesman" contains a well balanced assortment of these popular tools. Like other Mossberg "Silent Salesmen" it helps you move your stock of wrenches.



Write for catalog and complete information today



EVER-WEAR SOCKET SET NO. 60

## MOSSBERG CHROME MANGANESE STEEL WRENCHES and TOOLS



"The hardest work needs  
Mossberg Wrenches"

FRANK MOSSBERG CO.  
Lamb Street  
Attleboro, Mass., U. S. A.

BRANCH OFFICES  
Chicago, Ill.—180 N. Market Street  
Los Angeles, Cal.—5005 Cimarron Street  
Dallas, Texas—1129 N. Beckley Avenue  
Seattle, Wash.—214 Maritime Building  
Montreal, Que.—Office 21 Mt. Royal Hotel

FOREIGN SALES OFFICE  
461 5th Ave., New York City

## Selling trucks and buses is easier when you know the owner's viewpoint

### Read Motor Transport

It tells you the problems of the Fleet Owner. It tells you how Fleet Owners are making and can make a success of truck or bus operation.

Just as *Motor Age* tells you how to handle your business, so *Motor Transport* tells how to efficiently operate fleets of motor trucks and buses.

Reading *Motor Transport* will make you a better dealer.

Recommend fleet owners to whom you have sold trucks or buses to subscribe for *Motor Transport*. This magazine will make them more efficient operators.

You will both benefit!

*Motor Transport* is published semi-monthly, on the 1st and 15th. The subscription price is \$2.00 per year (\$2.50 West of the Mississippi).

Write for a sample copy.

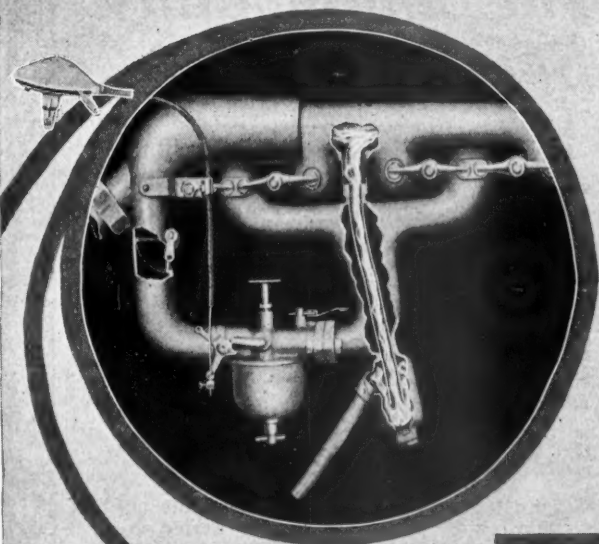
# Motor Transport

FORMERLY COMMERCIAL VEHICLE

(Published by the Class Journal Co.)

239 West 39th St. New York, N. Y.





**The intensive national advertising campaign of the Holley Carburetor Company and the Holley Hot Shot itself have already made a deep impression on the public. Dealers report a heavy demand. Ford owners everywhere are asking for Holley Hot Shot and installing it on their engines.**

**There are thousands of Holley Hot Shot prospects right in your territory. Every Ford owner should have one. Now is the time for action. Your territory may still be uncovered. Write for particulars of the Holley dealer proposition and get your share of this profitable business.**

Holley  
Carburetor  
Company,  
Detroit, Mich.

Kindly send us complete information regarding your dealer franchise for handling the Holley Hot Shot for Ford cars ☐ Also please send us a sample ☐

**HOLLEY CARBURETOR COMPANY**

**DETROIT, MICHIGAN**

Name \_\_\_\_\_

Business \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

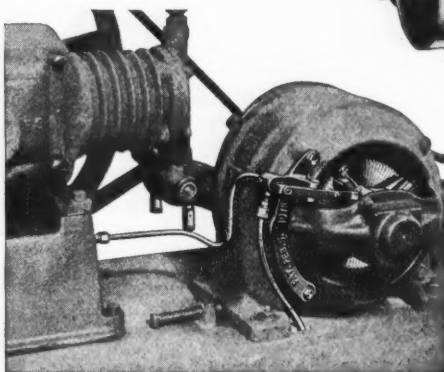
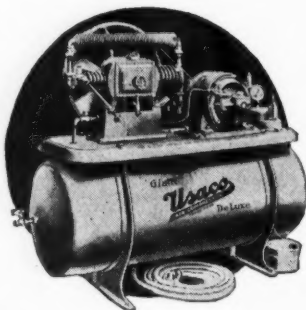
### A Four Fold Advantage

The Usaco Unloader on A. C. Equipments in conjunction with the Auxiliary Starting Tank—

Takes the starting load off the motor, Discharges the oil and moisture extracted by the Filtering Trap.

Protects the motor against low voltage overload and materially aids in cooling the air.

**Usaco**  
AIR COMPRESSORS  
TRADE MARK



### The Line of Many Refinements

THE unprecedented success of Usaco Air Compressors is attributable to a number of valuable refinements, noteworthy among which is the Usaco Automatic Unloader.

This unloader affords many advantages, one of which is very exceptional.

Adequate lubrication of accurately fitted pistons requires a liberal amount of oil, some of which undoubtedly gets into the air during compression.

Air also carries moisture which condenses while cooling, after compression.

On most compressors this unavoidable accumulation of oil and water is carried directly into the tank and later into tires. But, in the Usaco it is caught in a filtering trap and discharged by the Usaco Unloader.

This Unloader is amply covered by patents and, therefore, the advantages it affords can be obtained only in Usaco Compressors.

**THE UNITED STATES  
AIR COMPRESSOR CO.**

5304 Harvard Ave., Cleveland, O.

Freezing  
will not  
spring  
an  
ATLAS



**ATLAS** RADIATORS  
FOR FORDS

The Atlas Radiator has a big feature that will bring you sales this winter. It is burst-proof. The special brass honeycomb core is constructed to expand with freezing water and will not become distorted or sprung.

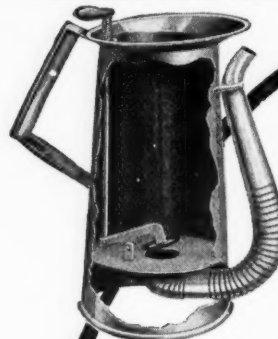
It has a greater cooling area and greater water capacity and is interchangeable with the standard Ford shell.

Write for details on the "Radiator with the Backbone" Made of Brass.

Made by  
The Steidle Mfg. Co., Cincinnati, Ohio

Exclusive Foreign  
Distributors

The  
A. C. Vanderpoel Co., Inc.  
11 Moore St., New York City



**It's Good to  
Use or Sell**

Many jobbers and dealers in the automotive trade conduct garages or service stations. They find Brookins Measures mighty good to sell.

The flexible metal nozzle and the thumb valve are advantages that you can appreciate at sight. Convenience, time-saving and oil-saving are obvious.

Use it yourself. And don't neglect the generous profit that you'll find in its sale.

Write today for sample and trade prices.

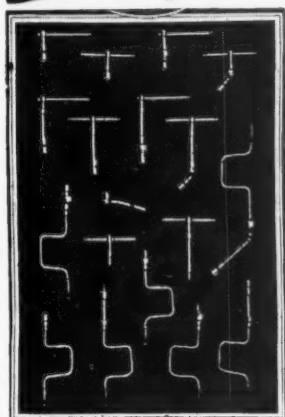
**The Brookins Mfg. Co.**  
228 Bayard St., Dayton, Ohio

Export Office, 11 Broadway, New York City.  
Cable Address  
"Brookins" New York. All Codes Used.

The Brookins Measure is made in one-quart, two-quart and gallon sizes, all copper finished. All sizes have the flexible metal nozzle that reaches any oil intake without the use of a funnel, and the thumb valve that controls the oil flow instantly and positively. These are distinctive Brookins features.

**Brookins**  
OIL MEASURE





140 Combinations  
all in ONE set.

## "They've Got the Guts to Stand the Gaff"

"I KNOW because I've been using a set for more'n a year. During this time nearly every size, make and type of car, from ancient Pope Hartfords to nice, slick new babies, right off the showroom floor, has come into the shop for one thin' or 'nother.

"Sometimes it was only to get tap-pets set an' then again it was for a general overhaulin'.

"Never am I on the job without my set. Never has it failed me. I can't say too much in favor of it, and I've tried them all. Your sockets are the only ones I've found with the guts to stand the gaff."

So spaketh one, Bill Regan by name, and a mechanic by birth, nature and inclination. Bill has his own little shop

in the yard at 67 Elm Street, New Haven. He's invested about \$3,000 in tool equipment. He says the H & G Wrench Set is the best investment he has made.

You can make 140 different combinations from this one set: everything you need in the way of a wrench. T and L wrenches, long and short, with ratchet or plain, speed or regular, universal or straight.

Man, you need this H & G Wrench Set. Retails \$11.50 complete. Discounts to the trade. Your jobber will be glad to co-operate with you to make each man the owner of a set. For with such a set of wrenches the shoemaker soon becomes a careful and thorough workman. And a good man is an asset to any shop.

THE EASTERN MACHINE SCREW CORPORATION,  
10-20 Barclay Street, New Haven, Conn.

# H & G Wrench Set



## You can't beat a leather fan belt

**Y**OU can't compete with nature in the making of belts. Nothing has ever been made, or ever will be made to give the service—the long wear, the grip and pull—of honest leather.

And drivers are realizing this now as they never have before. They want *leather fan belts*—Graton & Knight fan belts.

The display case above is to help you tell the world that you have what it wants. In orderly array, well displayed, is fan belting that you can talk about and that will back up in service what you say about them.

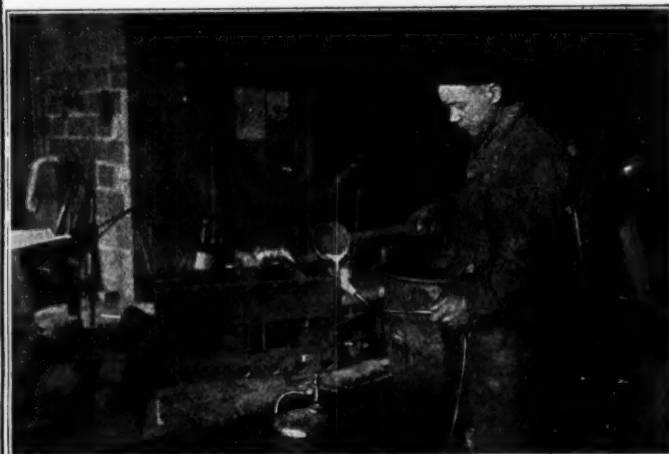
The famous Graton & Knight Link "V" belt in the display case is one of the fastest sellers, and one of the most profitable ones, you ever handled. Of wonderful strength, easy to make endless, noiseless in operation, almost indestructible—the Link "V" has friends everywhere.

Ask your jobber about the Graton & Knight display case. Get yours now.

**GRATON & KNIGHT**  
WORCESTER, MASS.



*Nothing takes the place of Leather*



### BABBITTING BEARINGS

## TORIT TORCH OUTFIT NO. 13

"I CAN DO  
THE JOB  
IN A JIFFY"

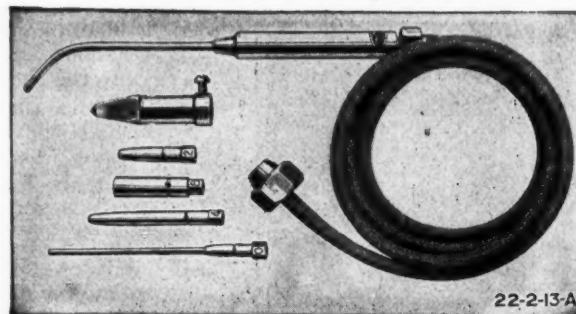
A TORIT TORCH No. 13 will not only do radiator repairing quickly and efficiently, but saves time in general soldering, wire splicing, light brazing, loosening corroded nuts and bolts, and hundreds of other jobs. Thousands in use are earning big profits.

### Uses Acetylene Only

A splendid use for old auto-acetylene tanks. Easily carried to the job. Ready the instant you light torch.

Outfit complete including torch, 4 different tips, soldering copper, 5 ft. hose and tank connection .....

**\$7.50**



22-2-13-A

Order from your jobber, or

**ST. PAUL WELDING & MFG. CO.**

169 W. Third St.

St. Paul, Minn.

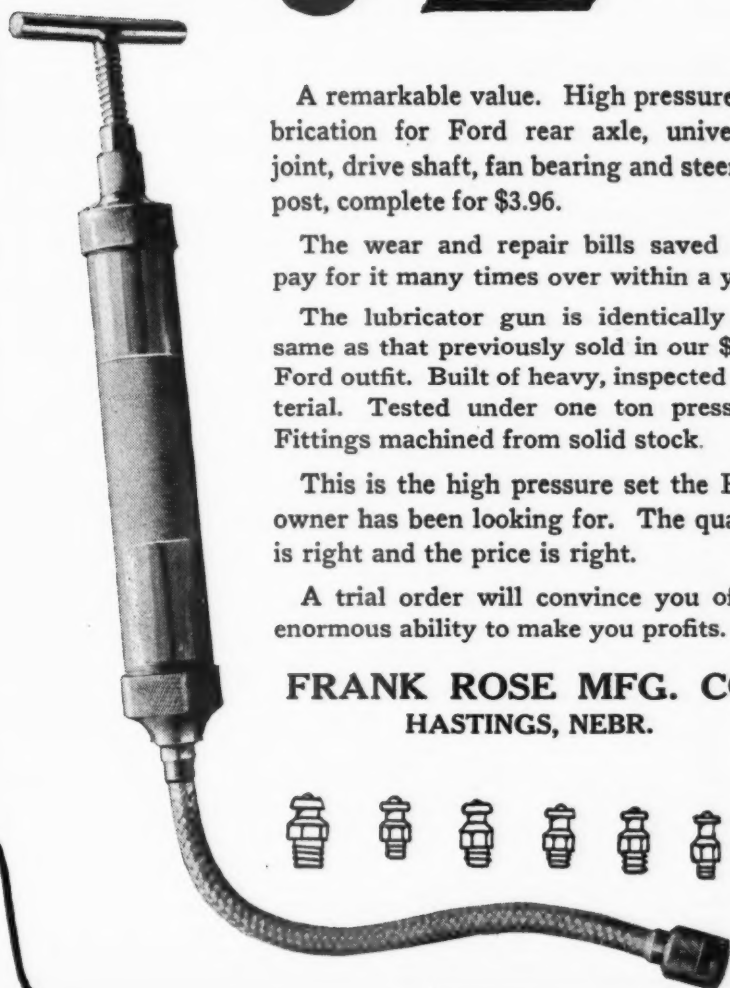


# ROSE High Pressure Lubricating System

## Prices Reduced

### Ford Set

*~with fittings~*  
**\$3.96**



A remarkable value. High pressure lubrication for Ford rear axle, universal joint, drive shaft, fan bearing and steering post, complete for \$3.96.

The wear and repair bills saved will pay for it many times over within a year.

The lubricator gun is identically the same as that previously sold in our \$9.80 Ford outfit. Built of heavy, inspected material. Tested under one ton pressure. Fittings machined from solid stock.

This is the high pressure set the Ford owner has been looking for. The quality is right and the price is right.

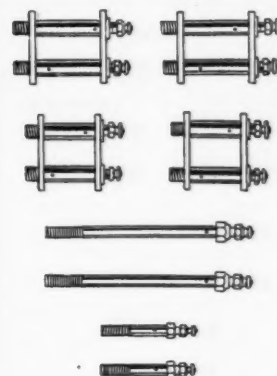
A trial order will convince you of its enormous ability to make you profits.

**FRANK ROSE MFG. CO.**  
 HASTINGS, NEBR.



### Extra Fittings

**\$3.96**



If the purchaser of the Ford set also wants pressure fittings on his spring shackles, steering bolts and tie rods, we supply these special high grade steel fittings, bored and fitted. Sell the Ford set first, then sell the extra fittings.

If your jobber does not carry the Rose Lubricator write us and we will supply you direct.



**LOMAR**  
SHOCK ABSORBERS  
THEY SMOOTH OUT  
THE ROUGHEST ROAD

**"There's a Regular Shock Absorber"**  
No air—no oil—no friction to look after and to adjust. Just comfortable safe riding—real pleasure—no worry—no fussing.  
A fast seller and properly priced.  
Send for our catalog.

**The LOMAR Manufacturing Co.**  
Middletown, Ohio

## You May Beat The Price But Never The Performance

### The PACIFIC RIM TOOL

is sold on merit only

**C**HEAPNESS doesn't mean a thing when a rim has to be removed correctly, quickly and safely. The "Pacific" has been made first to perform right; secondly at a price which is as low as systematic manufacturing facilities will permit. With the "Pacific" you get a tool that you can rely on for any type or size of split rim and you know that the strength of the jack-screw principle of operation gives you perfect control at all times.

#### PACIFIC RIM TOOL CO.

16606 Waterloo Road  
Cleveland, Ohio  
2339 11th Ave.  
Seattle, Wash.  
Export Office  
44 Whitehall St.  
New York

Weights only 10 lbs.  
List Price only  
\$10.00




**DE LUXE Products**  
For the Motorist's Comfort

Let the DeLuxe  
Tire Pump bring  
1924 Prosperity

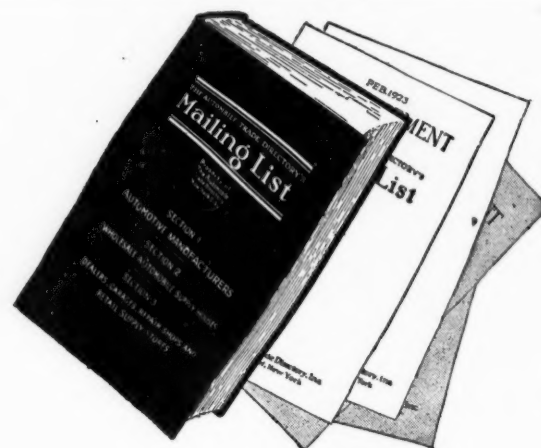
Only \$3.50 Retail

ORDER DIRECT  
SPECIFYING  
JOBBER

**The DeLuxe TIRE PUMP**

Also  
ARVIN HEATERS  
DE LUXE,  
DE LUXE VENTILATORS

**INDIANAPOLIS PUMP & TUBE CO.**  
INDIANAPOLIS



### Every Sales Prospect in the Automotive Industry

The Mailing List of The Automobile Trade Directory is a complete roster of the individuals and concerns who buy and specify or authorize the purchase of practically everything that is used in the manufacture and maintenance of automotive vehicles.

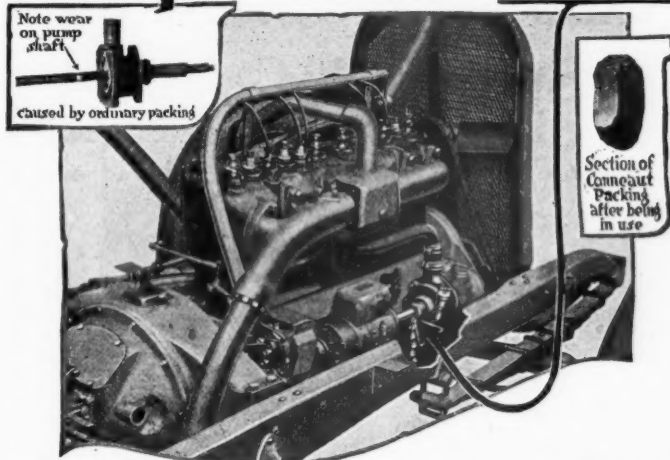
The manufacturing, jobbing, retail and service fields are covered by the three sections into which this List is divided. For direct circularization, for planning the work of salesmen and for reference purposes this Mailing List is indispensable.

Send for specimen pages and details.

**THE AUTOMOBILE TRADE DIRECTORY**  
239 West 39th St., New York



# Stop That Leak



## "Conneaut" PLASTIC METALLIC PUMP PACKING DOES THE TRICK

Puts a permanent stop to that water pump leak. Plastic in form—you mold it with your fingers to fit any size stuffing box. Makes an adjustable smooth metal bearing—practically frictionless—Good for years of service. Will seal pump shafts **TIGHT** even after they have become worn and won't respond to other packing methods.

A big help to all Garages and Service Stations. Makes car owners happy.

**JOBBERS:** There is no material

you can handle with more satisfaction and profit than Conneaut Plastic Metallic Packing. The displaying of a sample by your salesman will convince that there is a ready market for Conneaut Plastic Metallic Motor Engine water pump packing. A sale of this material to the garage man means repeat orders; it sells itself after the first sale and makes you friends. We furnish attractive display cartons and give selling assistance. Write us today for full information.

The CONNEAUT PACKING COMPANY, Conneaut, Ohio

**SHOW** any man the automatic locking feature of the STA-SET Wrench and your sale is closed. You will find him quick to appreciate its principle, quick to appraise its value as an exceptionally good tool. The STA-SET is destined to become the world's greatest adjustable wrench.

Obviously, quick turnover insures increasingly satisfactory profits.

Write for illustrated folder and price list.  
Give jobber's name.

**HJORTH TOOL CORPORATION**  
JAMESTOWN, N.Y.

## Victor

### Truck Head Lamps

### The Victor No. 461 Gas Tail Lamps

### Sturdy Gas Lamps for Heavy Trucks

The Victor gas head lamps are built to withstand the very hardest kind of service.

Owners of very heavy truck fleets find these lamps more reliable and economical, particularly when the service is rugged and when all night hauls make too great a demand on the battery.

Every magneto equipped truck should be equipped with Victor Gas Lamps. They are made for heavy, medium and light weight trucks. Write for details.

**THE CINCINNATI VICTOR COMPANY**  
714 Reading Road, Cincinnati, Ohio

Owners, by purchase of the Jobbers' Division of the Corcoran-Victor Co.

## ARS Radius Rod And Axle BRACE

A new, patented auxiliary for Ford cars, which is proving to be one of the most important and useful recently produced.

Reinforces the Radius Rod and the Axle, preventing any break-down at these points and adding strength and durability to the whole chassis. Easy to put on; won't work loose or break.

Retail Price Per Set **\$1.75**

*Liberal Discount to Dealers*

Every Ford owner is a live prospect; and after he buys is a booster for the Brace. Write for full information; or send an order on our guarantee.

**ARS Auxiliary Spring Co., Inc.**  
Dept. 4, Birmingham, Ala.



## SAVE THE OLD FLYWHEEL

When the problem of replacing broken or battered fly-wheel teeth comes to you don't lay up the car to wait for a new flywheel.

It is cheaper, quicker and BETTER to save the old fly-wheel and replace the teeth with an Excelsior Steel Ring Gear.

The operation is simple. Put

the old flywheel in a lathe and machine off the old teeth. Heat the Excelsior Ring Gear and shrink it in place.

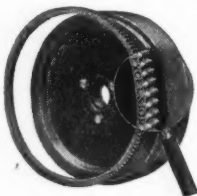
It pleases the customer on time and expense but best of all it provides you with a double profit.

Order through your jobber. If he cannot supply you, write to us.

**The Springfield Mfg. Co.**

221 West Main St., Springfield, Ohio

Made of S.A.E. 1035 Steel with the teeth cut and chamfered to the correct diameter and pitch to insure quiet and smooth operation.

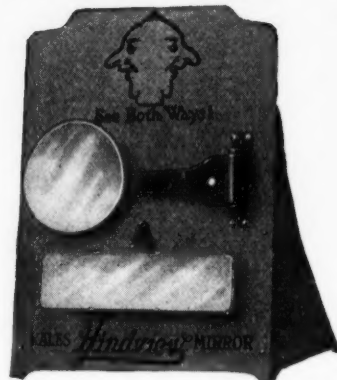


Each gear is weld tested under hydraulic pressure. Made in sizes to fit any American car or truck.

# EXCELSIOR STARTER GEARS

## KALES *Hindview* MIRRORS Special Offer

6 Mirrors  
and  
15 Brackets  
with  
Display Stand



### Retails at \$19.75

This special initial stock of six mirrors and fifteen brackets includes free display stand. Two of the mirrors are attached as shown. This stock enables you to fit any car.

If you are not now carrying Kales "Hindview" Mirrors, order this special stock offer from your jobber today. Stock mirrors and brackets separately. There is a proper mirror and bracket that really fits any car.

**Kales Stamping Company**  
1673 W. Lafayette Blvd. Detroit, Michigan



# How

this man qualified  
for \$3000<sup>00</sup> a year Salary

Two years ago, Walter Knudson, was out of a job drifting from one thing to another. His family was rather disappointed, for they had expected big things of him and he didn't seem to measure up.

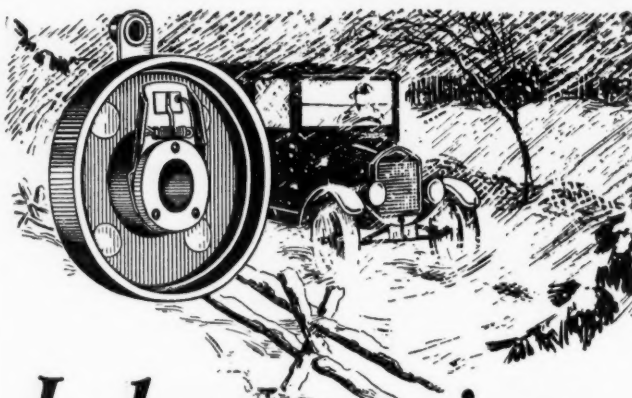
One day, Walter met a friend who in driving through the town, had stopped over. He told Walter how in a short time from a similar position, he had built for himself, a business paying \$5,500 the second year! "It's the most fascinating profession in the world," he said, and here's how—

### "You Too Can Attain Success"

"Don't envy a successful person,—be one yourself. Write for the same information that gave Walter Knudson the key to my golden opportunity. It is FREE for the asking. It tells exactly how to apply yourself to positively qualify in three months for an income of \$3,000 a year and better." Take this tip and write without delay to the

**SCHOOL OF AUTOMOTIVE ELECTRICITY INC.**

Associated with the  
**SCHOOL OF ENGINEERING OF MILWAUKEE**  
Dept. MA11—415 Marshall St., Milwaukee, Wisconsin



## In heavy going ~

a Ford is no better than its timer. Bell reveals untold power in sand and mud, on hills and in the traffic. Clean, smooth pickup; a snappy getaway; easy starting—all are bywords to the owner of the Bell-equipped car.

### The BELL Timer

makes the best Ford motor better. Precision made. Needs no oiling or attention. Cannot short-circuit. Is oil, dirt, and waterproof.

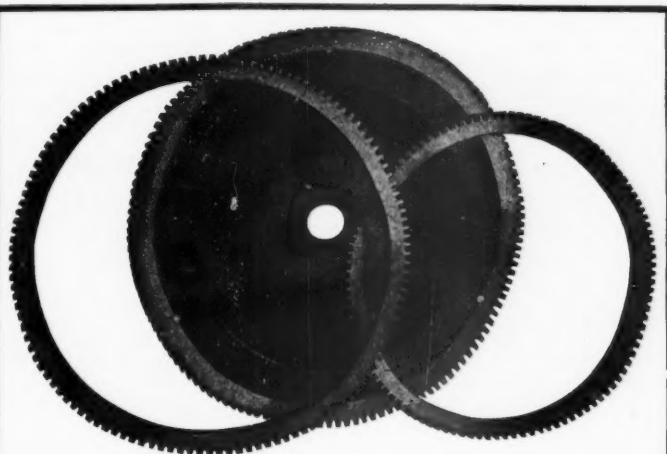
Solid Bakelite shell      Copper brush  
Copper contacts, molded in  
Clean wipe contact

Sold by leading jobbers everywhere.

**Bell Manufacturing Co.**  
13 Elkins St., Boston 27, Mass.







## New Low Prices On Fly Wheel Rings

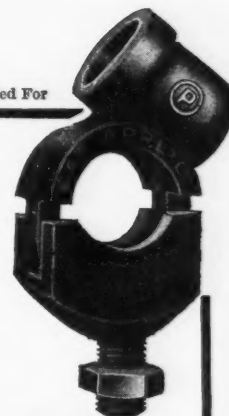
Increased quantity production has enabled us to get out a new and lower price list on Meachem Steel Gear Rings for Fly Wheels. Also our trade discounts have been increased to more than offset the lower list prices. Write us for the new list and discounts.

**The Meachem Gear Corp'n.**  
Ring Dept. Syracuse, N. Y.

Patent Applied For

# New!

The latest addition to the O P VISE Type Battery Terminal family.



## O P's "4-in-One" Elbow Vise Type Battery Terminal

Takes the place of both positive and negative right and left hand elbow type terminal.

Big time saver. Big decrease in your terminal stock and investment.

### FREE — Sample — FREE

Write us on your letterhead, tell us from whom you buy your battery equipment and we'll send you sample free.

BUY THEM FROM YOUR JOBBER. HE STOCKS THEM.

**THE OHIO PARTS CO.**  
3303 Colerain Ave., Cincinnati, O.

## IN CLEVELAND— IT'S THE HOLLENDEN

### Not Expensive

#### ROOMS—

Large comfortable and well-furnished:  
83 Rooms, hot and cold running water, \$2.50  
210 Rooms, single with bath, \$3.00 - \$3.50  
192 Rooms, with bath . . . . \$4.00  
160 Rooms, double, with bath, \$5.00 - \$6.00  
135 Rooms, large double with bath, \$6.00 - \$7.00  
Many Sample Rooms and Parlor Suites, \$7.00 up

**BREAKFASTS**—Club Breakfasts with generous portions at 65c, 75c and \$1.00.

**LUNCHEONS**—A la Carte in four nationally famous restaurants.

**DINNERS**—A la Carte. Special Sunday table d' hote dinner at \$2.00.

**CAFETERIA**—Hollenden Cooking and Service at Cafeteria prices.

**DANCING**—Dinner Dancing with Carl Rupp's Hollenden Dance Orchestra every evening excepting Sunday. No Cover Charge.

ROSCOE J. TOMPKINS  
Manager

If An Insulator  
Fails,  
the Spark Plug  
Fails  
Therefore—Use

# "775"

There's no two ways about it, the insulator is the life of the spark plug. It's got to be good or the spark plug will fail. That's why we suggest you use "775" equipped spark plugs. And the manufacturers of better spark plugs will say the same thing too. They use "775" insulators themselves.

Write for a list of spark plugs using "775."

**FRENCHTOWN PORCELAIN CO.**

Trenton, N. J.

"Established 1910—  
Busy Ever Since"

## THE BETTER SPARK PLUG INSULATOR

## Increase the EARNING capacity of your garage

by using DICKERSON Turntable and Service Jacks. Cars moved instantly—easily. Spring replacements and chassis repairs made in much less time—raises car frame by any fraction of an inch, making bolt holes line up perfectly. Works where no other jack will—does work impossible with others. Mechanism like heavy truck drive. Handles all cars—bumpers, trunk racks, etc., do not interfere. One man easily raises heavy truck.

Write for catalog. Some valuable territory open for "live jobbers."

**C. A. Dickerson Compressor Corp.**  
220-222 Chicago St., Buffalo, N. Y.

**DICKERSON  
GARAGE JACKS  
AIR COMPRESSORS  
SHOP EQUIPMENT**



Turntable Jack No. 11

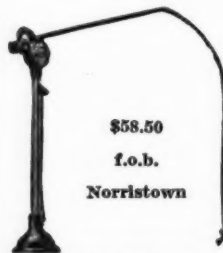


## Re-Babbitted Bearing Exchange

Our Re-babbitted Bearing Department is over two years old. Over 200,000 Con. Rods have been shipped. Less than one to each 2,000 have been returned as faulty. We have over 5,000 SATISFIED DEALERS in 16 States. We Re-babbitt ANY Bearing that has ever been Babbitted. Special undersize for Re-ground crankshafts 10 per cent extra.

A few of our LOW RETAIL PRICES are:—Marmon and Studebaker \$4.00. Chalmers and Moline Tractor \$3.50. Buick and Maxwell \$3.00. Oakland and Olds \$2.50. Fordson and Dodge \$2.00. Fords 60c each. Liberal Discounts to Dealers and Garages. We pay Transportation one way. RUSH Orders shipped same day order received. Satisfaction guaranteed.

**Fremont Foundry & Bearing Works**  
1340 W. 5th St., Oklahoma City, U. S. A.



\$58.50

f.o.b.

Norristown

**Franklin**

The

**Air and Water Station**  
that makes free air pay

A big Business getter for all garages and service stations. Stands 12 ft. 6 in. over-all; glass-encased revolving head wired for an electric light; long air hose that will reach two cars without moving them. No springs to rust or lose tension. Order today from your jobber or write for full particulars.

**FRANKLIN AIR COMPRESSOR WORKS**  
2604 Main Street, Norristown, Penna.

**You Can Forget That Joint  
Forever If You Pack With**

TRADE  
**TENAX**  
MARK

**SHEET PACKING  
Compressed Asbestos**

Men who once use Tenax prefer it to all other Compressed Asbestos Sheet Packings. A quality packing—proved so by its long life and splendid performance. Tenax has been used consistently for 20 years.

Ask for Tenax, the "Original Blue Sheet." In size 50x50 in. from 1/32 to 1/4 in. thick. Also in black graphited sheets 1/64 in. thick.

If your jobber doesn't handle Tenax, write us for information and name of most convenient source of supply.

**Advance Packing &  
Supply Co.**

808 Washington Blvd., Chicago

## ARE YOU LOOKING FOR A REAL BARGAIN?

Watch the classified advertising columns of MOTOR AGE and you'll see many of them. Often a man has goods for quick disposal and he announces the fact here. Whether or not you are in the market right now for certain things you will find it pays to look over the classified ads every time you receive your copy of the paper. It's a good habit to get into and some day you'll be mighty glad of it.

*Get the Habit—*

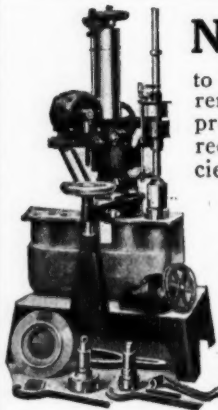
**READ THE CLASSIFIED ADS  
IN MOTOR AGE**

## NOW IS THE TIME

to be making the big profits from cylinder renewing. The winter months are most profitable to the man equipped to handle reconditioning and rebuilding jobs efficiently in his own shop.

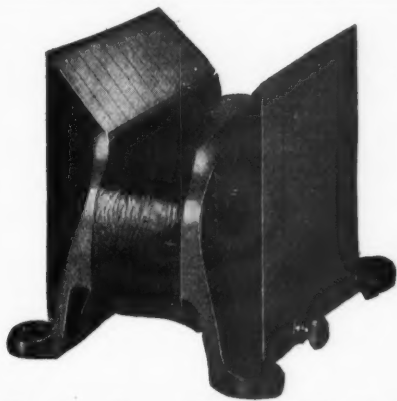
**Stormizing Machines**

will handle all your cylinder renewing. They enable you to give better service in shorter time and at increased profits. Write today for the Storm Book: Modern Cylinder Methods.



**STORM MFG. CO.**  
406 A Sixth Ave. So. Minneapolis





## This Growler Costs But \$4.50

With it you can tell in ten seconds whether an armature is in good condition. If it is not, you are saved all the grief of having to do the whole job over, losing all your profit and the customers' goodwill besides. Operates on 110 Volt A. C. Current.

Sold direct or through your jobber. Resale price \$4.50 in Central and Eastern States, \$5.00 in Pacific States. Your check for above amounts plus twenty-five cents postage brings this moneymaker to you.

ARMATURES: We rewind any and all kinds of GENERATOR, MOTOR and MAGNETO armatures, and reship same day old armatures received.

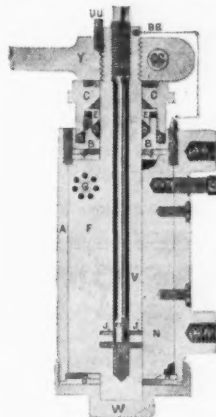
FORD GENERATOR AND MOTOR ARMATURES.....	\$ 1.50
ALL SMALL DOUBLE UNIT GENERATOR AND MOTOR ARMATURES.....	5.00
SINGLE UNIT MOTOR GENERATOR ARMATURES.....	10.00
MAGNETO ARMATURES.....	\$3.75 to \$4.75

## Armature Rewinding Co., Inc.

3301 Washington Blvd., St. Louis, Mo.

## Engineers and Dealers Be sure and see our exhibit at the NATIONAL AUTOMOBILE SHOWS

After 15 years of experimenting I have succeeded in inventing my latest Giant Oil and Air Shock Absorber. This works on a rotary system and is attached lengthwise on the frame and the shock rod is attached to the axle. It is in a class by itself—The Best in the World. In general merits it is at least 100% ahead of my famous device which has been on the market for a number of years and which many thousands of auto owners now enjoy.



30 DAYS FREE TRIAL or longer if desired.

GUARANTEED FOR 5 YEARS

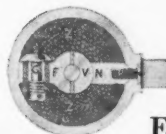
As to our financial standing and reliability we refer you to Dun's or Bradstreet's.

We would be glad to send you our detailed illustrations and you see at a glance the correctness of our statements.

We are showing working models of both devices at the New York and Chicago Auto Shows.

New York Automobile Show,  
258th Field Artillery Armory,  
January 5 to 12, 1924.  
Space 266.

Chicago Automobile Show,  
Coliseum and First Regiment Armory,  
January 26 to February 2, 1924.  
Space 64.



ERNST FLENTJE

1643 Cambridge St., Cambridge, Mass.

Telephone University 0950

Branch 1887 Atlantic Ave., Brooklyn, N. Y.  
Tel. Haddingway 2373.

## Every "STOP" Light needs this Switch



Price  
50  
cents

—bound  
to sell fast

Car owners will buy Elm City No. 50 Switches just as fast as they learn about them.

For an Elm City No. 50 will make any "STOP" signal work.

Dealers like to handle it because it is popular and sells fast.

Water, dust and rust proof. Mechanically perfect. Absolutely guaranteed.

Get the details.

Jobbers

Dealers

Every STOP light owner is a prospect. You will be interested in our special trade offer—and discounts.

**The C. S. Mersick & Co.**

274 State Street, New Haven, Conn.

ACCURATELY MACHINED **SEMI-STEEL REPLACEMENT PISTONS** ACCURATELY MACHINED



For replacement work after a rebores or re-grind job insures your customer as good if not a better job than the original assembly.

Dall Pistons are simply GOOD Pistons, made to manufacturer's specifications, sometimes more refined in design and lighter in weight, but always as carefully made and inspected as though they had to pass the most rigid inspection of a Motor Manufacturer.

Dall Pistons are regularly furnished in standard and various oversizes, also semi-finished 1/16 oversize.

Write today for price list and delivery schedule on all items. Distributors at various points will take care of your requirements.

**THE DALL MOTOR PARTS COMPANY**

Post Office Station D, Cleveland, Ohio

Southwestern Branch

THE CARROLL CO.

2218 S. Harwood St., Dallas, Texas

## Is Your Battery Business Paying?

If it isn't, it will be worth your while to investigate the Dragon franchise, because Dragon dealers, without exception, are making money and building a permanent business.

Write or wire

Englert Manufacturing Co.  
Pittsburgh, Pa.

**Dragon Storage Battery**



**Johnson**  
SPARE TIRE LOCK

Made by  
JOHNSON AUTOMOBILE LOCK CO.  
DEPT B, ST. LOUIS, U. S. A.



**Monogram Light Distributors**

Standard equipment on 114  
of America's foremost  
cars and trucks.

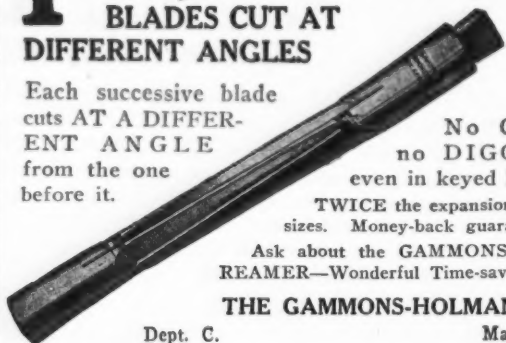
Pass I. E. S. rules and all  
state tests

MONOGRAM LENS CORPORATION  
52 Vanderbilt Ave. New York

## PAROB EXPANSION HAND REAMER

BLADES CUT AT  
DIFFERENT ANGLES

Each successive blade  
cuts AT A DIFFER-  
ENT ANGLE  
from the one  
before it.



No CHATTER,  
no DIGGING IN—  
even in keyed holes.

TWICE the expansion of others. All  
sizes. Money-back guarantee.

Ask about the GAMMONS TAPER PIN  
REAMER—Wonderful Time-saver.

THE GAMMONS-HOLMAN CO.

Dept. C.

Manchester, Conn.

## COLONIAL CYLINDER HONES

PRICES REDUCED ONE-HALF

\$17.50

\$17.50

You can now buy the Colonial Cylinder Hone, an approved tool for this class of work and one of the best Hones on the market at \$17.50 each F. O. B. Kalamazoo. Made in three sizes, one, two and three, No. 1 2 3/4" to 3 1/2", No. 2 3 1/4" to 3 3/4" bore, No. 3 3 3/4" to 4 1/4".

Colonial Cylinder Hones are now being used by some of the best factory Service Stations in the country as well as by numerous Service Station Owners.

Colonial Gear & Manufacturing Co., Kalamazoo, Mich.



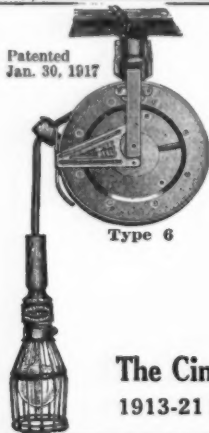
For information about the  
Durant and Star Car selling  
franchises write

DURANT MOTORS, Inc.

560 Jackson Avenue,  
Long Island City, N. Y.



Patented  
Jan. 30, 1917



Type 6

## Autex Extension Reel

Takes light where wanted. Cord locked  
at any desired point and rewound auto-  
matically on reel when not in use.  
Used in all places where extension of  
either light or power is required, elim-  
inating the inconvenience and danger  
of loose cord extensions.

Approved by Underwriters

The Cincinnati Specialty Mfg. Co., Inc.,  
1913-21 Powers St., Cincinnati, Ohio

## WEL-EVER OIL CONTROL PISTON RINGS

Write for interesting circular on oil pumping and details about this fast  
selling piston ring.

THE WELEVER PISTON RING CO. Toledo, Ohio  
1713-15 Canton St.

Less Oil and Gas—from  
WEL-EVER equipped  
units. Its oil control  
feature is guaranteed to  
stop oil pumping, pre-  
vent spark plug fouling  
and reduce carbon for-  
mation.



## Noiseless Timing Gears

Install quietness — Cloyes NOISELESS  
Timing Gears. They give the motor a  
soft, even "purr"—permanently.

Cloyes Gear Works  
1614 Collamer Ave., Cleveland, O.

Sales Representatives  
United Autoware Co., Flisk Bldg., New York City  
N. Lowenthal, Box 952, Ft. Worth, Texas

**bethlehem betterments**  
for Motordom  
Utilities—Not EXCESSories!

## TAKE THE END-PLAY OUT!



—WITHOUT PULLING THE MOTOR

THE C. A. ADJUSTABLE CENTER BEARING CAP  
corrects Ford crankshaft end play and sets magneto for  
highest efficiency without removing the motor. Easily  
and quickly installed. Guaranteed for one year. List  
price \$3.75. Ask your jobber or dealer or write us direct.

Pat'd 7-22-'22

ADJUSTABLE BEARING CO., Inc.  
Dept. M. Brazil, Indiana

THERE are two factors that determine the value of a  
publication as an advertising medium.

Editorial excellence will indicate its influence with its readers.  
Membership in the Audit Bureau of Circulations indicates its business  
ethics and methods.

The first shows whether the paper is worth reading.

The second shows how many people read it.

In both the advertiser is vitally interested.

MOTOR AGE invites the closest scrutiny. Its A. B. C. report is  
accessible to advertisers.

## STEVENS TOOLS

SPEED  
UP



OVER 50 WONDERFUL SHORT CUTS  
IN NEW CATALOG T-105

ASK FOR IT

STEVENS & COMPANY  
375 BROADWAY, NEW YORK



## PARANITE CABLE

Best for Automotive Work

We carry at all times a complete stock of every kind of cable used for automotive work. Many years of specialization have brought **PARANITE** Cables to the highest state of perfection. The finest grades of rubber compound, cotton and flexible enamel varnish are used.



FOR 33 YEARS THE STANDARD

"IF IT'S **PARANITE** IT'S RIGHT"  
Quality jobbers handle quality cable—that's **PARANITE**.

**Indiana Rubber & Insulated Wire Co**  
Factory and General Offices—Jonesboro, Ind.

## Speaking of Batting Averages

Babe Ruth .....393  
**ANCHOR BULBS** .....993



We are out to make it 1,000. Can't be done, you say? Our triple-test has kept one large auto lamp maker from finding a bad Anchor bulb in three years. Laugh that off!

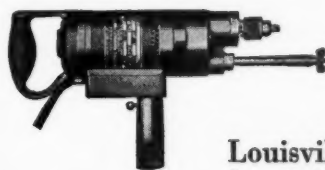
**JOBBER**—What's wanted is a lamp that doesn't fail. What's wanted **SELLS**. The money-maker for you and your dealers is the Anchor: triple-tested, never beated.

### SAME DAY SERVICE

Send a sample order, find out how quickly and accurately we ship; and with it get our prices and generous discounts. Obey that impulse! Write.

**Anchor Electric Co.**  
555 W. Jackson Boul. Chicago, Ill.

## Get This "Pioneer" Garage Special

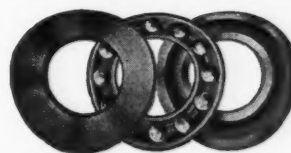


Electric Drill and Valve Grinder

Greatest time and money saver, as well as money maker, for your shop—

"It Will Do The Work"

**Louisville Electric Mfg. Co.**  
Incorporated Louisville, Ky., U. S. A.  
C. E. Willey, Pres. J. B. McFerran, Secy.-Treas.



The Bearings Company of America, manufacturers of STAR Ball Retainers, for Thrust, Magneto and Cup and Cone types of Bearings. Complete Thrust Ball Bearings, Angular Contact Thrust Bearings and Angular Contact Radial Bearings (made to your B/P's and requirements).

**THE BEARINGS COMPANY OF AMERICA**  
LANCASTER, PA.

Detroit Office,  
1012 Ford Bldg.



## JOHNSON No. 101 Bench Furnace

A necessity in every shop

For heating soldering coppers, metal melting, heat-treating, tempering parts, tools, etc.

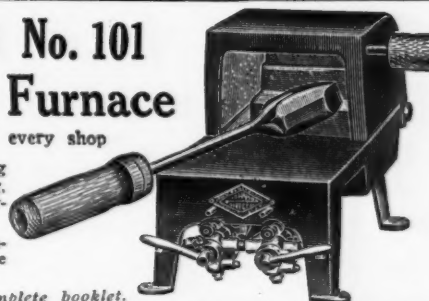
Will produce a temperature of 2000 degree F. in the fire-box.

Write today for complete booklet.

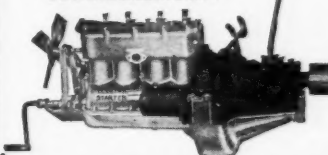
**Requires no forced Air Draft**

**JOHNSON GAS APPLIANCE CO.**  
Cedar Rapids IOWA

Pacific Coast Representative: C. B. Babcock Co., San Francisco, Cal.



## 3 SPEED SLIDING GEAR TRANSMISSION



for More Power — More Speed

This transmission has three speeds forward and one reverse and replaces the regular Ford transmission, drums, bands and all. The low gear is lower than the Ford, therefore more power, third or high is the same as the Ford high and second is halfway between.

for Ford Cars and Trucks

### CRONK SIMPLEX Sliding Gear Transmission

This transmission is ruggedly built with oversize alloy steel gears. Multiple disc clutch. Foot brake on jack shaft outside of case. Hyatt Roller and Genelite bearings. Installation easy. No cutting or machining.

Write today for other interesting details.

**E. D. & A. F. Cronk, Inc.**

140 Hotel St.,  
UTICA, N. Y.



### Dependability

In the new Waukesha Bus and Truck Motor emphasizes itself not only in performance, but in steady low operating cost, especially.

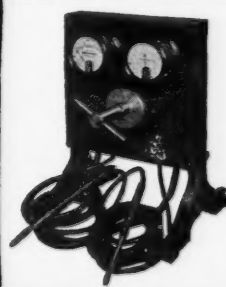
Write for full details

**THE WAUKESHA MOTOR COMPANY**  
Waukesha, Wis.

**BUS and TRUCK MOTORS**

## ACE HIGH-RATE BATTERY TESTER

shows voltage drop and ampere draw



### Inspires Confidence

Shows your customer in a positive way when his battery needs repairs or should be replaced with a new one. In addition to profit it adds to the appearance of your shop and inspires confidence in your ability.

**Price \$39.50**

F. O. B. CHICAGO

Voltmeter and ammeter, precision type, 4 inch diameter, sapphire jewelled. Variable carbon rheostat — 0 to 600 amps.

**ORDER FROM YOUR JOBBER**

**WEIDENHOFF** 4350 ROOSEVELT ROAD  
CHICAGO, ILL., U. S. A.

**GIANT LICENSE PLATE HOLDERS**

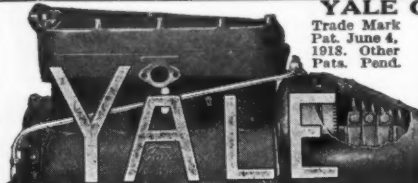


When you lose a license plate the cost is from \$2.50 to \$5.00. With Giant license plate holders you need not fear losing your license plate as they are fastened permanently to the holders and can be installed in one minute's time. Guaranteed to give perfect satisfaction or money refunded. If your jobber cannot supply you, write us direct.

List price 90c for four.

**RED GIANT TOOL CORP., Lynchburg, Va.**

**YALE OILING SYSTEM FOR FORDS**



Trade Mark Pat. June 4, 1918. Other Pat. Pend.

Jobbers cash in now on strong advertising and sales campaign. Over 1,000 Ford dealers sell it. Write for discounts.

**Roland & Koch**  
411 S. Main Street  
Los Angeles, Cal.  
Waco Sales Co.  
Harrisburg, Pa.

**DUESENBERG**  
*The Original Straight-Eight*  
*With Four Wheel HYDRAULIC Brakes*  
**INDIANAPOLIS U. S. A.**

**UNIVERSAL**



Beveled Edge with Oil Groove


2 rings that cover every need

Ground or turned finish  
Attractive jobber's proposition

**UNIVERSAL MACHINE CO.**  
BALTIMORE, MD.

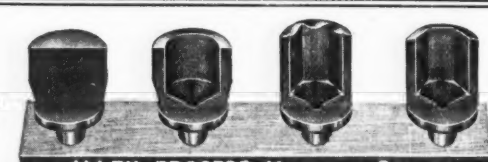
**There's a WATKINS Branch Near You**

If you want genuine Watkins Rebuilt Connecting Rod Service, which includes not only rebabbitting the rod to S. A. E. specifications, but equipping the rod with laminated shims, new bronze piston pin bushing and new bolts and nuts, send your old rods to the authorized WATKINS plant nearest you. Rebuilt rods shipped same day they are received.



**WATKINS Complete Rebabbiting Service**

**Allen Process Making a Socket**



Cold-Drawn Sockets

**ALLEN Wrench Sets**

**The Allen Manufacturing Company, Hartford, Conn.**

**WARNER GEAR COMPANY, MUNCIE, INDIANA**




**CLUTCHES, TRANSMISSIONS, CONTROLS, DIFFERENTIALS**

**MONOGRAM**  
*The*  
**Self Locking Radiator Cap**



**THREE PRODUCTS YOU NEED**



**ZIP FRICTION PASTE**, for fitting in bearings.  
**ZIP GRINDING COMPOUND**, for valves.  
**ZIP LAPPING COMPOUND**, for lapping in pistons.

The Original Write For Samples Ask Your Jobber.  
Water Mixed. **THE ZIP ABRASIVE COMPANY** Cleveland, O.  
U. S. Pat. 1353197 **THE ZIP MFG. CO.** Denver, Col.

**Battery Service Equipment!**

**UNITRON Rectifier**  
**PORTOSTAT Test Set**

**FOREST ELECTRIC COMPANY**  
New and Wilsey Sts., Newark, N. J.

**INTERNATIONAL**  
**MOTOR TRUCKS** *for low-cost hauling*

Models range from the 2,000-lb. Speed Truck to the 10,000-lb. truck. Some territory is still open for dealers.

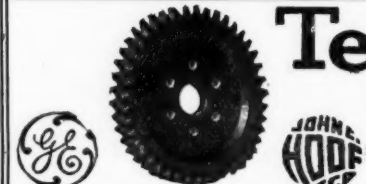
**International Harvester Company of America**  
(Incorporated)  
Chicago, U. S. A.

**APPLEBY**  
**USED CAR**  
**PLAN**

—the Solution of the used car problem!

**Percy Chamberlain Associates**  
1320 Book Bldg., Detroit

**Textolite**  
**TIMING GEARS**



A General Electric product. Made entirely of cotton fabric processed to wear like iron. Eliminates all noise from the timing gear assembly. For practically all cars. Write for prices.

**JOHN C. HOOF & CO.**  
157 W. Illinois St. Chicago

**BOSCH**



**American Bosch Magneto Corp.**

Main Office & Works: Springfield, Mass.

Branches: New York, Chicago, Detroit, San Francisco

Trade Mark Reg. U. S. Pat. Off. Over 700 Service Stations and 1400 Dealers

**KISSEL** *The Aristocrats of Motordom*




*The Custom Built Car*

7 Models—Open and Closed

Distributors in principal cities. Open territory now being closed.

**Kissel Motor Car Co.**  
Hartford, Wis.

**TESTBESTOS**  
**AUTOMOBILE BRAKE LINING**



**AMERICAN ASBESTOS CO., NORRISTOWN, PA.**



**THE QUINCY SILENT AIR-MASTER***The Most Air Per Dollar Cost***WALL PUMP & COMPRESSOR CO.**

Quincy, Ill., U. S. A.

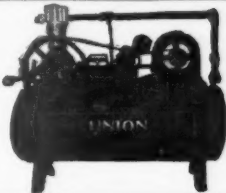
**GRINDING  
MACHINES****BORING  
MACHINES****LANDIS****LANDIS TOOL COMPANY**

WAYNESBORO, PA.

NEW YORK OFFICE:  
30 Church St.**For Unusual Service**

Union Air Compressor, Union for Service, Union for Strength, Union for Reliability. Built by Union Equipment Co., Butler, Pa. The best machine on the market for the money.

Union Equipment Company  
Butler, Penn.



**Garage Tools**  
make well equipped  
shops. Ask your  
jobber.

Fast and ACCURATE for re-  
facing, reseating and grinding  
all size valves.

Sioux Flexible Shaft and At-  
tachments take the tool to the  
work.

Albertson & Co., Sioux City, Ia.

**Welco Accelerator**

for Fords  
Easily installed—one hole to drill.  
Works independent of throttle. Any  
engine speed by setting adjusting nut.  
In colored carton complete with in-  
structions. Write your Jobber.  
Also makers of Welco Step  
Plates, Gas Tank Caps, Blanket  
Holders, etc.

The Welker-Hoops Mfg. Co., Middletown, Conn.

**KING QUALITY**

ALL THE NAME IMPLIES

STEERING KNUCKLE BOLTS AND BUSHINGS  
PISTON PINS, PISTON PIN SET SCREWS

Automotive Division

KING SEWING MACHINE CO.  
BUFFALO, N.Y. BRIDGEBURG, ONT., CAN.

**Hycor**  
*Brake Lining*  
FOLDED AND STITCHED  
HYDRAULIC COMPRESSED

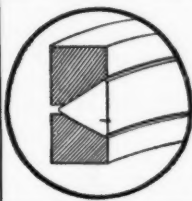
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Instantly adjusted to any desired shading position with one  
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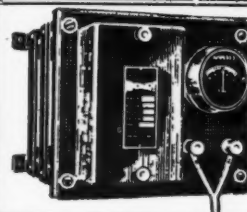
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**Cyclo "Dynamic" Hot-Spot  
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This "Modified Vapor" manifold gives a gas with lots of  
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INSHIELD 8  
4 1/2 in. diameter. Heavy  
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Made of heavy sheet brass.  
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finish only. Simplest and  
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The Inshield Products Co., Toledo, Ohio  
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Eight body types—\$1295—\$2250

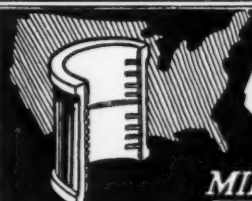
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Finer Motor Cars  At Lower Prices

**Empire**  
Tires and Tubes  
"Wear Longest"

THE NEW EMPIRE  
DISTRIBUTION PLAN  
enables dealers to make extra profits on  
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Write Milwaukee Die Casting Co., Mil-  
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MILWAUKEE BEARINGS

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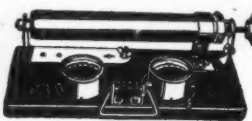
The finest quality hand blown triple strength crystal sheet glass cut to exact size and finished on one edge. Packed in a manner that minimizes breakage. Jobbers and dealers can carry stock with little chance of damage. Write for complete details.  
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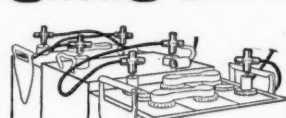
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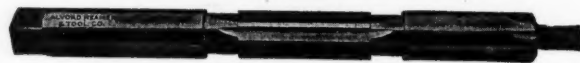
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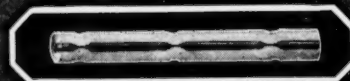


The remarkable showing of the Fronty-Ford in the 500-Mile Race at Indianapolis May 30 was due solely to the performance of the Frontenac Cylinder Head. This Head is adapted for use on your Ford car by its designer and builder, Arthur Chevrolet. Write for FREE Catalog. Book, "How to Build a Fronty-Ford," \$2.00; free with orders of \$50.00 or more.

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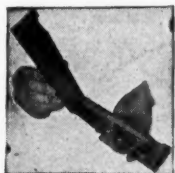
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SAMPLE FREE

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In a baked-on black enamel pressed steel box with cover HINGED at one end. Famous N. B. trademark in gold. Handle  $\frac{1}{4}$ " hex. not 7-16". Heat-treated sockets. Jobbers and dealers enthusiastic. Attractive Counter Display holds 10 sets. Retail price \$1.25.  
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THE NEW BRITAIN MACHINE CO., New Britain, Conn.

## BRUNNER AIR COMPRESSORS

"Good for Twenty Years at Hard Labor"  
BRUNNER MFG. CO., UTICA, N. Y.



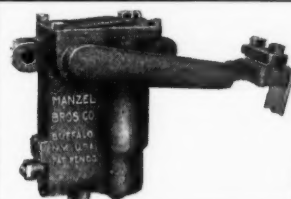
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Absorb all road shocks—quickly and smoothly on a cushion of oil. Easily installed on all makes of cars.

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Bumper  
for every car



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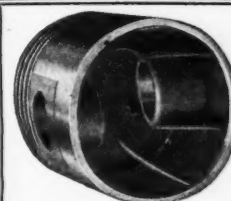
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for almost any car, truck and tractor.  
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"EVERLASTING PERFORMANCE"

Engine Sealed and Guaranteed for 2 Years

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supplied for ANY MAKE of car. Easily installed. Golden repair opportunity. Write for price list and BIG DISCOUNT.

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**DUPLEX** Second Spare Tire Carrier And Rim Tool  
Two tools for the price of one. Holds tires securely. Expands and contracts rims. Attached instantly. Write for details.

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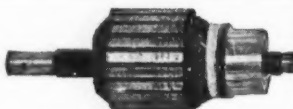
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Send it to us. We are "Armature Winding Specialists."

Profit for you in our service—Ford generator armature rewind—\$1.95. Other prices in proportion. All work guaranteed. Write for catalog and prices on all generators.

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Should Be On Every Car  
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Spencer



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AFTER testing for 8 months under actual service, Buick engineers have recommended the HALL CYLINDER HONE for use in all their branches.

Your jobber will supply you.

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"The Signal  
with a Smile"



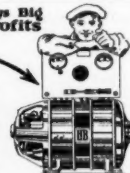
At dealers or direct  
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Pays Big Profits

Start this big money-making battery charging business.

Small cash payment brings you HB 8 hour charging outfit. Easy terms of only \$20 monthly let your profits pay balance with nice surplus besides. Thirty day free trial on money back guarantee. HB patented voltage-regulating winding absolutely prevents reversing. Saves current. You can easily clear \$150 to \$300 every month. Write today for information. HOBART BROS. CO. Box AR5, Troy, Ohio



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Our Cylinder  
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**SELF-ALIGNING BURNISHING MACHINE**  
Makes it possible to fit over-size pistons without removing engine from the car when the variations do not exceed 5/1000 of an inch. Cylinders slightly tapered, out of round, or with shoulders worn by pistons or rings may be made round, straight and true. Price \$25. 12 ounce can Wood-Imes Compound, \$1.50. Write for complete details. WOOD-IMES MFG. CO., Minneapolis, Minn. FORMERLY MID-WEST MFG. CO.



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Prices on exchange of connecting rods

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Ford	.60
Maxwell	2.80
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Studebaker	3.00

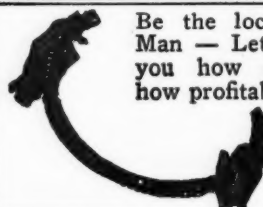
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Connecting rods or Main bearings for any make of Car, Truck or Tractor.

### 24 HOUR SERVICE

If you have tried INTERSTATE BEARINGS you will not be satisfied with anything less.



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"Sav-Oil" is stamped on bottom of every ring

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**Bumpers for all Cars**  
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For Oil at Curb

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and scratch paintwork unless protected. Likewise grease and cushions don't go well together. But Kleenkar shop covers take away any chance of either accident. The trouble, work and kicks they save show up in bigger profits on more work. Send for samples, prices and descriptions.

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Won't Leak Because They're Sealed With Oil

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THE CLEARING HOUSE OF THE AUTOMOTIVE INDUSTRY, FOR PARTS, ACCESSORIES, TIRES MACHINERY REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

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West Point, - - Iowa

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Parts for most all Cars.  
Radiators for Fords—Reliable—\$8.50.

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ANY PART for ANY CAR NEW or USED  
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For Sale at Bargain Prices

These are excellent all purpose engines, compact, completely equipped and absolutely new. Special price in lots of ten or more. For full particulars communicate with

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GENUINE GERMAN BOSCH MAGNETOS, NEW ENCLOSED TYPE

	OUR LIST	PRICE
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ZH 6 (M14)	15.00	60.00
ZR 4 (2 spark single)	30.00	100.00
ZU 4 (2 spark dual)	35.00	100.00

BIG DISCOUNTS ON NEW PARTS.  
GEARS—AXLES—SPRINGS—BEARINGS—PISTON PINS—VALVES—TIMING GEARS.  
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## We've Got Everything

In New and Used Auto Parts, Accessories and Supplies, for all makes and models of cars.

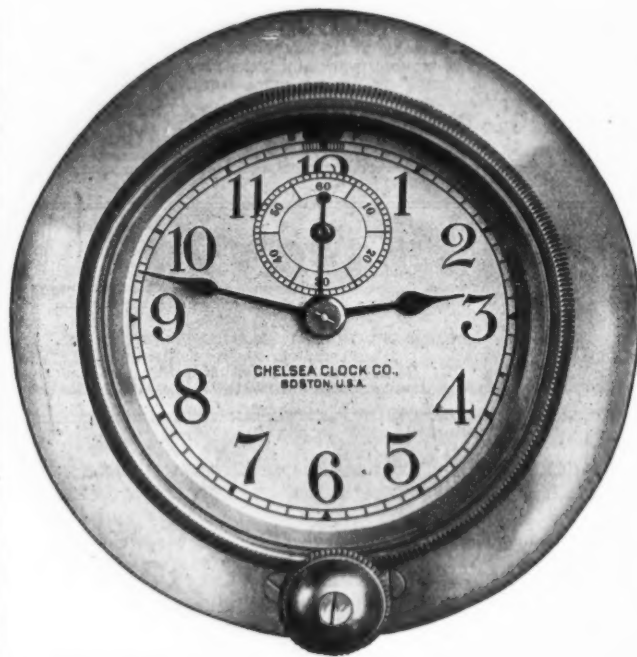
Engines; Transmissions; Clutches; Axles; Wheels; Rims; Tires; Radiators; Gears; Axle Shafts; Bearings; Magnets; Starters; Generators; Coils; Batteries; etc., etc.

Ours is the largest stock of its kind in the world.

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World's Largest Replacement Parts House

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The 8 Day—High Grade, Flush Inset Model J, with outside winding and setting device. (Also other models and finishes).

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ALL OTHERS are COMPARATIVE

Scientifically Built to  
WITHSTAND the JOLTS and JARS  
of Automobiles, Trucks, Motor Boats, etc.

— AND —  
**KEEP EXCELLENT TIME**  
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Last Practically Indefinitely  
Cost More Than Others

—BUT—  
**THE VALUE IS THERE**  
ASK any USER

**TO DEALERS** We give you a liberal discount insuring good profit on each sale. You can confidently recommend the World Renowned CHELSEA Clocks to the most exacting customer—Many clocks wanted for replacement and equipment.

CATALOG on Request

**CHELSEA CLOCK CO. Established 1897**  
10 State St., Boston, Mass.

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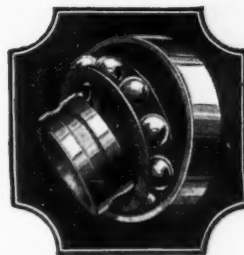
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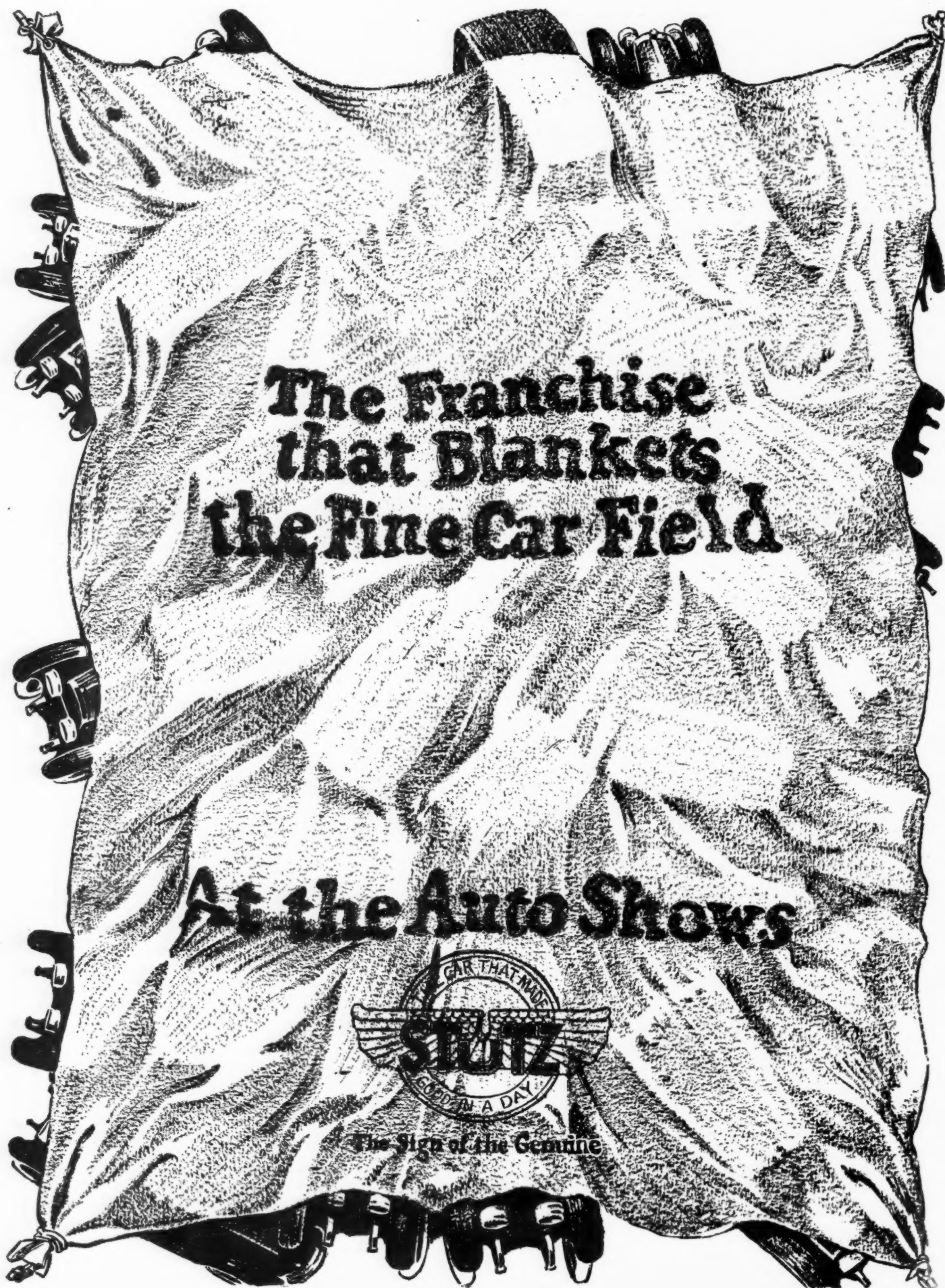
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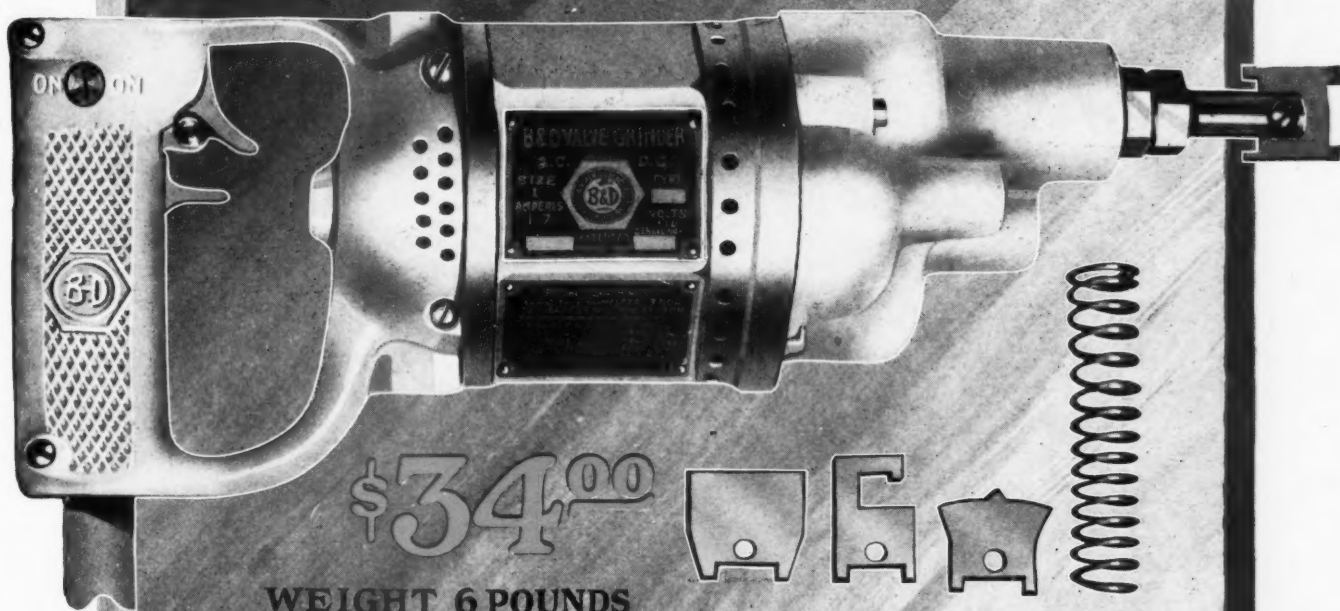


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